

No. 12848

United States
Court of Appeals
For the Ninth Circuit.

THE PARKER APPLIANCE COMPANY, a Corporation,

Appellant,

vs.

IRVIN W. MASTERS, INC., and JOSEPH C. COLLINS, Doing Business Under the Firm Name and Style of Collins Engineering Company,

Appellee.

Transcript of Record
IN FOUR VOLUMES
Volume II
(Pages 467 to 924)

Appeal from the United States District Court,
Southern District of California
Central Division.



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June 21, 1950—10:00 o'Clock A.M.

The Clerk: Further trial, Parker vs. Masters and Collins.

Mr. Huebner: Shall we proceed, your Honor?

The Court: Yes, you may proceed.

JOHN N. WOLFRAM

the witness on the stand at the time of adjournment, being heretofore duly sworn, resumed the stand and testified further as follows:

Cross-Examination
(Continued)

By Mr. Huebner:

Q. Mr. Wolfram, at the close of yesterday's court session, you were asked to produce some notes that you made regarding physical measurements of the dimensions of Exhibit 36. Were you able to locate those? A. Yes. I have them here.

Q. Referring to your notes and to Exhibit 36, which is the cut-away specimen, will you please state to the court what you found the measurement to be across the largest diameter in the area of the shoulder of the sleeve, that is, prior to assembling the fitting?

A. The largest diameter of the sleeve head, that is the diameter adjacent the shoulder of the sleeve on this particular sample, was 1.7845 inches before assembly. [452]

(Testimony of John N. Wolfram.)

Q. By what instrument did you make that measurement?

A. That was made with a micrometer.

Q. Would you explain to the court the physical shape of that micrometer so the court knows what it was you used?

The Court: I know what a micrometer is.

Mr. Huebner: All right. Then it won't be necessary to pursue the question.

The Court: I don't think so, unless you think the judges in the upper court don't know what a micrometer is.

Mr. Huebner: I think, perhaps, if it should become necessary, we can show one.

Q. I believe you said yesterday that you did not take a measurement of the same diameter, that is to say, the same diametrical region after the parts were assembled and tightened, is that right?

A. That is correct.

Q. The way the exhibit is cut away, would it be possible at this time to make a measurement across the diameter of the shoulder?

A. I haven't quite figured out how it would be possible to make a very accurate measurement at that point.

Q. Yesterday, I believe you were depending upon visual inspection as a basis for a statement that the sleeve head radially expanded due to tightening. That is right, isn't it? [453]

A. That is correct.

Q. Now, how much would you say, from your

(Testimony of John N. Wolfram.)

visual inspection, that diameter had increased due to the so-called radial expansion?

A. Well, the diameter of the sleeve head appears to have increased just about the same as the initial clearance that had existed between the sleeve head and the nut. I say just about because it appears that the corner of the sleeve at the shoulder bears somewhat upon the slight fillet radius in the nut, and it may not have expanded the full amount of the initial clearance, because the fillet itself may have prevented that full amount of expansion.

Q. Well, based on your estimate from the visual observation of that exhibit, what was that clearance, which you say has just about been used up, and state it to the court in thousandths of an inch?

A. Well, from my measurement, the initial clearance seems to have been 7/1000ths of an inch in the diameter, or $3\frac{1}{2}$ /1000ths of an inch on the side.

Q. How did you determine that originally? By measurements?

A. I have another sheet here which lists the initial inside diameter of the nut.

Q. Well, was that figure taken by your personal measurement or from an AN standard sheet? [454]

A. No. This was taken from a measurement under my direction.

Q. And what instrument was used to measure the internal diameter of the nut?

A. That instrument was a plug gauge, and the

(Testimony of John N. Wolfram.)

plug gauges that were available, I believe, were graduated in half-thousandths, so that this measurement that I have here would be correct within a half-thousandth. [455]

Q. All right. Now, I believe you said yesterday that there was expansion due to the tightening at what you may call the nose of the head of the sleeve? A. Yes.

Q. Did you make any measurement of that?

A. Not on this sample.

Q. Did you make any measurement of expansion anywhere on the sleeve head?

A. No, I made no physical measurements of this sleeve head after it had been assembled.

Q. From your visual observation will you state to the court approximately how much radial expansion there appears to have been halfway down the head of the sleeve, and also at the nose or extreme end of the sleeve?

A. I can't say just what the radial expansion has been at the other points of the sleeve.

Q. All right. That is because it is impossible to determine it merely from inspection?

A. It is impossible to determine an accurate figure of that kind just from visual inspection.

Q. Is it possible to determine an approximate figure?

A. It might be. I haven't figured that out.

Q. You can't, without taking time out to really study it, you can't by just looking at this Exhibit

(Testimony of John N. Wolfram.)

36 state to the court what you think that expansion might be? [456]

A. At the lower end of the sleeve you are referring to?

Q. In the two regions, halfway down and at the lower end. A. That's correct.

Q. Yesterday we had some conversation about one of your illustrative drawings. I will refer to your drawing and I will identify the exhibit number in a moment.

Mr. Freeman: It was Exhibit 28-Q.

Q. (By Mr. Huebner): 28-Q, where you illustrate your idea as to the advantage obtained, or at least one of the advantages obtained by having a taper on a sleeve head. Do you have that before you? A. Yes, I have.

Q. According to this, I believe it is your theory or opinion that having an angle on the sleeve head gives you maximum shoulder contact between the shoulder on the nut and the shoulder on the sleeve, is that right? A. That's right.

Q. And you illustrate there a fillet, an annular fillet in the interior surface corner of the nut, don't you? A. Yes, I do.

Q. Will you tell the court what a fillet is?

A. A fillet is a rounding off of an inside corner between two surfaces that are at an angle to each other. [457]

Mr. Freeman: Will you point that out to the court on the chart, please?

The Witness: Your Honor, this is the radius or

(Testimony of John N. Wolfram.)

curve which we refer to as the fillet (indicating).

Q. (By Mr. Huebner): It is because of that fillet, I assume, that there is a bevel on the corner of the sleeve head?

A. Well, that is not the only reason. That is one reason, yes.

Q. Will you point out the beveled corner of the sleeve head to the court, on that drawing?

A. That is this angular line which takes the sharp corner off the edge of the sleeve head.

Q. The removal of that material furnishing a relief is necessary in order for the two parts to fit together, isn't it? A. On both parts?

Q. Well, if you have a fillet on the inside of the nut, then you have to have relief in some form, and that form of a bevel is satisfactory for the parts to properly fit together, isn't that so?

A. That is so if the diameter of your sleeve would otherwise project into the area of the fillet.

Q. And the portion of the sleeve head which is beveled furnishes no bearing surface for contact with the nut for [458] endwise thrust, does it?

A. That's correct, the nut does not contact the beveled part of the sleeve for endwise thrust.

Q. Then the material in the sleeve head representing a somewhat pie-shaped or triangular segment, bounded on one side by your broken line, and on the other side by the outside line of the sleeve head, is excess material, is it not, so far as end thrust is concerned between the nut and the sleeve head?

(Testimony of John N. Wolfram.)

A. This dotted line to which you have referred is not a projection of the corner of the beveled surface which intersects the horizontal surface, so that your statement is not quite correct.

Q. Let's assume that dotted line, broken line—I will ask it this way: What is the broken line for the way you set it up?

A. The broken line is a projection from the diameter of the sleeve at the lower end of the sleeve.

Q. It is a projection of what?

A. It is a projection of that diametrical dimension in a plane parallel with the side wall of the nut. [459]

Q. Well, that broken line terminates—if it were extended, it would terminate at its upper end approximately at the point where a bevel on the sleeve head begins, wouldn't it?

A. As shown in this non-dimension drawing, it would, yes.

Q. It is your drawing. Is there anything wrong with it, as far as dimensions go?

A. This drawing was not made from dimensions. It was just an illustrative drawing made practically free-hand, as I said, to illustrate a point.

Q. Let's take it for what it shows, what it is, and assume that we may regard this pie-shaped or triangular-shaped segment that I talked about before, bounded on one side by the broken line, if extended on through, and on the other side by the outside line of the sleeve head. Now, that pie-shaped segment, as I have described it, and I ask

(Testimony of John N. Wolfram.)

you to assume it thus exists for the purpose of this question, does not perform any function, does it, so far as concerns end thrust by the nut against the sleeve head?

A. Well, if you make that assumption, then——

Q. Then I am correct, am I not?

A. That is correct, that it does not bear against the nut and does not take direct end thrust. It receives motion, of course, from the remaining portion of the sleeve, which is [460] in bearing contact.

Q. It receives motion just like a passenger riding on the running board of an old-fashioned automobile would receive motion, isn't that right?

A. Except here the connection is integral.

Q. Then do I understand that the only purpose you ascribe to that extra material on the outside of the sleeve head is for the purpose of having contact between the sleeve head at its shoulder and the adjacent inside surface of the nut?

A. The angle has been formed so as to provide a means for limiting expansion at the upper end. That statement is correct.

Q. When you say limits expansion, do you mean there must be actual physical contact between that outside circumferential surface of the sleeve head and the inside of the nut?

A. Well, either at the straight wall of the nut or in the fillet of the nut.

Q. Would you refer to another Parker patent, which is in evidence as Exhibit 26? It is Parker 1,977,240. That one, you will recall, is referred to

(Testimony of John N. Wolfram.)

in the patent in suit, and the patent in suit characterizes it as being an improvement over an older patent. The earlier patent, 1,977,240, is for a tube coupling, isn't it? [461]

A. I do not have a copy before me.

Q. I will get one out. I will loan you this copy, and the court, I believe, has the exhibit.

I assume you are familiar with this patent, Exhibit 26?

A. I am familiar with it, although I have not read it in close detail lately.

Q. Well, can you tell by examination of the drawing what it is and thereby refresh your recollection? You can just answer that question yes or no, if it is possible.

A. Yes, I think I am fairly familiar with this patent.

Q. Will you please explain to the court what differences, if any, there are between the early patent, Exhibit 26, and the patent in suit?

A. Well, the patent 1,977,240 embodies several principles. Fig. 1 in this patent—or I should say Fig. 3 in this patent illustrates the initial or finger-tight position of the parts, and you will note that the outside wall of the sleeve head is parallel with the wall of the nut, and that the shoulder on the sleeve, the shoulder 12 on the sleeve, is in a horizontal plane; whereas the shoulder 13 in the nut is at a slight incline so that it will initially contact the shoulder of the sleeve at the outer diameter of the sleeve head. Then as the coupling is tightened up,

(Testimony of John N. Wolfram.)

the outer contact [462] at the sleeve head, which I just mentioned, causes the sleeve head to swing inward to assume the position shown in Fig. 5, for example, so that the entire head of the sleeve has been swung inward in just the opposite direction from that shown or described in the Parker patent 2,212,183. [463]

Q. In other words, instead of expansion of the sleeve head, it is your view that there is a contraction of the sleeve head?

A. Yes, that is how I remember this patent.

Q. Do you think it would work the way it is explained?

A. I don't know. I never saw a physical embodiment.

Q. Do you know whether the Parker Appliance Company ever manufactured any couplings or fittings in conformity to this patent?

Mr. Freeman: He already answered that, that he never saw one.

Mr. Huebner: He said he never saw one, but he may know whether they manufactured that.

The Witness: To my knowledge they never manufactured them, and I am sure that they did not.

Q. (By Mr. Huebner): All right. Do you think it is a good structure?

A. Well, that would remain to be seen, I suppose, by experiment and application to a particular job.

Q. I am only asking for your thought, your

(Testimony of John N. Wolfram.)

view as an expert. Do you think that this would be a satisfactory structure that is illustrated in Parker patent Exhibit 26?

A. I think that answer would depend on what you are designing for and what you are looking for.

Q. Well, you are looking for a fitting that will seal [464] a flared tube onto a body, aren't you? In any of these, isn't that the major purpose?

A. That is the major purpose, yes.

Q. Would this work satisfactorily or wouldn't it?

A. I don't think I can answer that.

Q. All right. Now let's turn to the other early Parker patent, 1,893,442, which is in evidence as Exhibit 25 and is referred to in the patent in suit. Do you have a copy of that early one? I will give you one if you haven't.

A. No, I don't have one here.

Q. Mr. Wolfram, are you familiar with Exhibit 25?

A. I am generally familiar with it.

Q. You are aware, of course, that it is referred to in the patent in suit?

A. Yes.

Q. All right. What is the difference or differences, if any, between Exhibit 25 and the patent in suit?

A. One of the major differences is that in this patent it is contemplated that the sleeve head will expand, including its lower end, and expand into contact with the wall of the nut, and then will be backed up solidly by the nut.

(Testimony of John N. Wolfram.)

Q. That is the only difference worth noting, is it?

A. Well, this patent does not contemplate the initial toe contact as set out in the patent 2,212,183.

Q. Do I recall correctly that you testified earlier in [465] the trial that this patent Exhibit 25 is the one under which the AC-811 series of fittings were manufactured?

A. Prior to about 1939 or '40, yes.

Q. And subsequent to 1939 or '40, is it your testimony that the AC-811 fittings did not embody the teachings of the patent, Exhibit 25?

A. No; I testified that they embodied the feature of the 2,212,183.

Q. Then, the AC-811 fittings now, that is, since 1939 or '40, no longer embody any of the teachings of the early patent Exhibit 25?

A. I don't know whether you can say any of the teachings. It embodies the new features or new teaching of the 2,212,183 patent.

Q. Well, taking this Exhibit 25 on its face, can a satisfactory fitting be manufactured pursuant to that patent?

A. You can make a satisfactory fitting, but it won't be as good as the fitting of 2,212,183.

Q. A good many fittings were, however, manufactured under Exhibit 25, weren't they?

A. Yes.

Q. And put into general use? A. Yes.

Q. Some discussion was had concerning the use of lead tubes in fittings of this character. It is true,

(Testimony of John N. Wolfram.)

is it not, [466] that the Parker fittings made under the patent in suit are adaptable for coupling a flared lead tube to a body?

A. No, I don't think so.

Q. Would any of the fittings made by Parker Appliance Company, prior to the grant of the patent in suit, which was in 1940, be suitable for coupling flared lead tubes to bodies?

A. I can't think of any. None that I know of.

Q. You are aware, are you not, that Parker's catalogues or advertising literature recommend that their fittings are suitable for coupling lead tubes?

A. No, I am not aware of that fact.

Mr. Huebner: I don't want to hold court up. I have some of it in my notebook. I didn't know I would have to look for it, or I would have had it out.

I will ask the clerk to mark for identification a three-page printed leaflet or circular bearing the name "Parker Appliance Company, Cleveland, Ohio," and identified in the following respective order: Dimension sheet No. 1601, dimension sheet No. 1600-A, and dimension sheet No. 1600.

Mr. Freeman: Is that dated so that I will have some further identification?

Mr. Huebner: It is dated as issued January 1, 1933. [467]

Mr. Freeman: I object to that as absolutely immaterial as to what Parker may have sold in 1933, or what he advertised in 1933. We are not interested in that. This application was filed, if my

(Testimony of John N. Wolfram.)

memory serves me correctly, in 1938, and we are dealing with the fittings of the present time. I ask them, if they want to produce any literature, I want them to produce literature with respect to Parker's advertisement that the patent in suit be adapted and applicable for use with lead fittings.

The Court: Mr. Freeman, although I might agree with you, I think counsel has a right to have this marked for identification.

Mr. Freeman: I have no objection to that.

The Court: That's all in the world he has asked so far. You are anticipating.

Mr. Freeman: I may be a little premature, your Honor.

The Court: I think you are anticipating.

The Clerk: Exhibit F for the defendants for identification.

(The document referred to was marked Defendants' Exhibit F for identification.)

Q. (By Mr. Huebner): I would like to direct your attention to the drawings in Exhibit F for identification, and ask you whether you recognize the subject matter of those drawings. There are two or three of them. [468]

Mr. Freeman: You don't have a photostat of this?

Mr. Huebner: No. I did not know we were going to have to use it, so I did not photostat it.

Q. Are you able to answer that yes or no?

A. Yes. This exhibit——

Mr. Freeman: For identification.

(Testimony of John N. Wolfram.)

A. —for identification, F, illustrates the Parker triple type fitting as manufactured in 1933.

Q. (By Mr. Huebner): Now, would you say that that fitting is suitable for coupling flared lead tube to a body?

A. To my experience, I would say no.

Q. Would your answer still be no if I directed your attention to the language on dimension sheet No. 1600 of this exhibit, which I will read as follows: This paragraph is in the lower right-hand corner.

“Parker triple fittings are incomparable for joining aluminum alloy, lead, or similar soft tubing.”

A. My answer would still be no, yes.

Q. Were you with the Parker Appliance Company on January 1, 1933?

A. Yes. That was when I was there about a month and a half.

Mr. Huebner: Mr. Freeman, is there any question that these three sheets, Exhibit F for identification, are publications authorized by Parker Appliance Company? [469]

Mr. Freeman: I certainly admit that they were put out by the Parker Appliance Company, and any literature you present bearing the Parker name on it, as far as I am concerned, we will agree now it was put out by the Parker Appliance Company.

Mr. Huebner: I offer Exhibit F in evidence.

Mr. Freeman: I now object to the offer on the basis that it is immaterial. It deals with something

(Testimony of John N. Wolfram.)

not here involved and something that has transpired six or seven years prior to the advent of the Parker patent in suit.

The Court: Sustained.

Mr. Huebner: I would like to have marked for identification——

Mr. Freeman: If it has Parker's name on it, there is no question about it.

Mr. Huebner: ——a catalog entitled "Parker Tube Couplings and Associated Equipment, Bulletin No. 37," and the date of this is 1934.

The Clerk: Exhibit G for identification.

The Court: 1934?

Mr. Huebner: Yes, your Honor, 1934.

(The catalog referred to was marked Defendants' Exhibit G for identification.)

Q. (By Mr. Huebner): Would your answer to the question as to whether Parker fittings are suitable for coupling flared [470] lead tube to bodies be any different if I called your attention to the following language on page 42 of Exhibit G for identification:

"Parker triple couplings are incomparable for joining aluminum alloy, lead or similar soft tubing."

A. My answer would be the same.

Q. And would your answer be the same if I called your attention to the following language on page 63 of Exhibit G for identification:

"Copper tubing, plain and lead-tin coated, and

(Testimony of John N. Wolfram.)

Ambrac metal tubing, are used in the assemblies illustrated."

A. Yes. That reference to lead and tin-coated means that there is just a very fine coat of lead or tin on the material. The tubing is still substantially a copper tubing.

Mr. Huebner: I offer in evidence, your Honor, Exhibit G for identification.

Mr. Freeman: I am going to make the same objection I made in connection with Exhibit F.

The Court: Same ruling.

Q. (By Mr. Huebner): Mr. Wolfram, are you aware of any problem that confronted the aircraft industry with respect to flared tube fittings prior to the application for the patent in suit, which application was originally filed March 2, [471]

A. No, not directly.

Q. You would not then be able to testify of your own knowledge as to any particular problems that may have been solved by the advent of this patent in suit, would you?

A. No problems which existed before the application date, no.

Mr. Huebner: That concludes our cross-examination.

Redirect Examination

By Mr. Freeman:

Q. Mr. Wolfram, in connection with the use of lead pipe and the couplings of the kind here involved, have you carried on any experiments or

(Testimony of John N. Wolfram.)

have you tried using a lead pipe with a fitting of the kind here involved? A. Yes, I have.

Q. And what was the experience that you ran into?

A. Well, at very low torque, the lead just squashed out from between the fitting surfaces on the sleeve and on the body and moved into the threads of the nut, so that it was very difficult to disassemble the fitting. [472]

Q. And when you say at low torque, you mean a torque much lower than what would normally be required? A. Yes.

Q. And was that the basis of your answers to Mr. Huebner's questions when he read to you from two of the catalogues put out in 1933 and '34 by the Parker Appliance Company?

A. Yes, that's the primary reason, plus the fact that in all the years I have been at Parker I have never seen or heard of an actual sale or installation made with Parker fittings on lead pipe.

Mr. Freeman: I am going to ask the clerk to mark the device I have handed him Plaintiff's Exhibit 60.

(The device referred to was marked Plaintiff's Exhibit 60, for identification.)

Q. (By Mr. Freeman): I hand you some physical members which have been marked for identification Plaintiff's Exhibit 60, and will you tell us just what it is, what you know about it?

A. This is a Parker fitting which I used for con-

(Testimony of John N. Wolfram.)

necting up a piece of lead pipe. I flared the lead pipe in the ordinary manner prior to assembly, inserted it into the sleeve and nut and drew the nut onto the body. During the course of assembly the lead from the flare squashed out into the threads of the nut, and I had a lot of difficulty in disassembling the [473] fitting, and finally worked the lead flare out of the nut by threading it out. But since then I have not been able to reinsert the flare into the nut.

Q. And the condition of Plaintiff's Exhibit 60, for identification, is such now that the fitting would not be usable for reconnecting the lead pipe, is that correct? A. That's right.

Q. Is the lead pipe stuck within the threads of the nut member at the present moment?

A. Yes, it is.

Q. You say that when you disassembled the parts after they were assembled the lead pipe threaded itself out of the nut?

A. That was the only way that I could get the lead pipe out. I tried pushing it out but couldn't move it, so I finally jiggled it and worked it around until I had deformed the lead enough by such action to unfreeze it somewhat and then thread it out of the nut.

Q. When you say "threaded out," you mean by rotating the nut, really, on the tube, on the lead tube? A. That's correct.

Q. So that there was some portion of the flare

(Testimony of John N. Wolfram.)

actually projected into the depth of the thread?

A. That is correct.

Q. Would you say your method of unfreezing, in order to [474] disassemble the fitting from the lead pipe, in an actual installation, would be a practical job?

A. No, it wouldn't. If this was in a close-quarter airplane installation, or any other, it wouldn't even have to be a close-quarter installation, it would be extremely annoying and cumbersome to try and get that apart. In a close-quarter installation it is easily conceivable that you just wouldn't get it apart.

Q. Now that you have threaded it apart it is not in condition to be reused? A. That's correct.

Q. Did you, by any chance, in the unit that you have in your hand, Plaintiff's Exhibit 60, for identification, take any measurements as to whether even with lead there was any expansion of the sleeve?

A. Yes, I did. I measured the diameter of the sleeve at the lower end of the head prior to assembly, and again after it had been assembled, that is, while it was in the wrench tight condition, and I found that the sleeve head had expanded one-thousandth of an inch at the lower end.

Q. Did you measure that with a micrometer?

A. No; that measurement was taken on a comparator, which is more accurate, I think, than a micrometer.

Q. Would you tell the court just what a comparator is?

(Testimony of John N. Wolfram.)

A. A comparator is a machine for making measurements, [475] and it operates on the principle of shining a light across a surface so as to project a magnified image of that surface, I believe the magnification—in fact, I know the magnification was 31 and a quarter times. In making the measurement of the sleeve on the comparator I sighted or threw the shadow of one side of the sleeve and then established the indicator on the machine at zero point, and then moved the instrument by the proper controls so that the light would shine across the opposite face of the sleeve and throw the shadow at that point, and the indicators on the machine then gave you the reading, which represented the distance which you had moved, or in this case the distance across the points of measurement.

Q. When you made up the flare on the lead pipe did you follow the same technique as you follow in connection with the make-up of flare of what we call a hard metal tube for use with the fitting that you have in your hand?

A. Yes, I did. I used the same tools and used the same flare measurement specifications.

Q. Will you point out on the physical unit to the court the location of the lead pipe or the piece of lead, or the flare thereof, within the nut, and what you mean by the sticking within the nut?

A. Your Honor, this gray-colored piece is the tube; it was just a very short piece of lead tubing, and it only [476] extends part way into the sleeve, as you can see here; it is this enlarged part of this

(Testimony of John N. Wolfram.)

gray material which is stuck in the threads of the nut. I may be able to push it out now, but I can't push it back into the nut.

Mr. Freeman: I offer in evidence as Plaintiff's Exhibit 60 the Parker fitting with a piece of lead tubing or pipe therein.

The Court: It will be received.

The Clerk: 60 in evidence.

(The device, heretofore marked Plaintiff's Exhibit 60, for identification, was received in evidence.) [477]

Mr. Freeman: I am going to ask the clerk to mark another physical unit Plaintiff's Exhibit 61 for identification.

The Clerk: 61 for identification.

(The article referred to was marked Plaintiff's Exhibit No. 61 for identification.)

Q. (By Mr. Freeman): I am going to hand you Plaintiff's Exhibit 61 for identification. Will you tell us what it is and whether or not in the physical device that you have there you can thread out the pipe within the nut and, if you can, will you do that so that the court may observe just what you are doing?

A. This is a Parker fitting with a piece of lead pipe. I assembled this fitting in the same manner as the previous fitting which we have been discussing.

Q. Plaintiff's Exhibit 60.

(Testimony of John N. Wolfram.)

A. And found that the same thing had occurred, that the lead flowed out from between the seating surface of the sleeve and the body, and it jammed against the nut wall. When I first took it apart, the lead pipe was frozen into the nut so that I couldn't move it without difficulty. I finally broke it loose by twisting it with my hand so that I could rotate it within the nut, but we cannot push it out directly by end thrust.

I have not tried to thread it out of the nut as I did [478] the other fitting, Exhibit 60. Do you wish me to try to thread it out now?

Q. I would like to have you show that to the court now, if it is possible.

A. You see, your Honor, I have broken it loose. It is quite sticky in here now. In fact, it is at a point now where it is jammed. By putting end thrust on the tubing and rotating it at the same time, I may be able to thread it out in the same manner that I threaded the other one out. I have threaded it part way out. I still can't just slide it out. There, I have threaded it out of the nut.

Q. Now, might you re-insert the lead pipe back into the nut?

A. By pushing pretty hard, I was able to insert it by a straight thrust. It bent the lead, your Honor, a little bit, but I can't get it back out by trying to push it back out. In fact, it caught in the threads again, and the flare is now quite badly distorted. It was a nice uniform flare a moment ago,

(Testimony of John N. Wolfram.)

but you can see now that it has distorted considerably.

Q. I noticed when you were working with Plaintiff's Exhibit 61 for identification, you rotated the lead pipe and held the nut stationary. In actual practice, you wouldn't be in position to really rotate the pipe, would you?

A. No, not ordinarily. [479]

Q. It is true that the pipe may have connection at another end that would prevent rotation or twisting of the pipe?

A. Either connections or bends in the tubing.

Mr. Freeman: I offer in evidence the Parker fitting illustrative with a lead pipe as Plaintiff's Exhibit 61.

The Court: It may be received.

The Clerk: 61.

(The fitting referred to was received in evidence and marked Plaintiff's Exhibit No. 61.)

Q. (By Mr. Freeman): Mr. Huebner asked you for some dimensions or data with respect to Plaintiff's Exhibit 36, and I wish you would hand me the data.

A. (Witness complying.)

Mr. Freeman: I am going to ask the clerk to mark these two sheets for identification Plaintiff's Exhibits 62 and 62-A.

(Testimony of John N. Wolfram.)

(The documents referred to were marked Plaintiff's Exhibits 62 and 62-A for identification.)

Q. (By Mr. Freeman): I am now going to ask you how you connect up the dimensions that you gave Mr. Huebner on cross-examination with Plaintiff's Exhibits 62 and 62-A for identification, and the fitting, Plaintiff's Exhibit 36.

A. On the Exhibit 36, you will note that I have the numeral 4 scratched into the sleeve with a fine line. That numeral 4 corresponds to the sample number which is in both of [480] the sheets, Exhibits 62 and 62-A.

62-A shows the nut, and one column refers to aluminum alloy nuts, and the other column refers to steel nuts. This is a steel fitting, so that the steel chart would apply.

Exhibit 62 shows the sleeve, and again has two charts, and it is sample No. 4 of the steel chart which corresponds to the physical exhibit 36.

Q. And were these charts made up from stock material that you took from the Parker Appliance Company and thereafter had actual measurements of the physical device recorded upon Plaintiff's Exhibits 62 and 62-A for identification?

A. Yes.

Q. So that the recordings that you there made and the measurements that are there indicated are actual measurements, as distinguished from any

(Testimony of John N. Wolfram.)

AN standards with plus or minuses by way of clearance?

A. That is correct. These are actual measurements of the physical part.

Q. And the outside diameter of the sleeve, that is, the greatest diameter adjacent the shoulder, was measured and recorded by you?

A. Not by myself directly, but under my supervision.

Q. Well, all of the work that was done, I recognize you didn't physically cut some of these things apart, but it was all under your supervision and direction? [481]

A. Either that or done personally. In this case, it was under supervision.

Q. And the measurement of the inside of the nut was likewise done under your supervision?

A. That is correct.

Q. And we are now talking about the measurements for Plaintiff's Exhibit 36; correct?

A. That is correct.

Q. I notice on the Plaintiff's Exhibit 62-A, you have a cross section of a portion of the nut; correct? A. That is correct.

Q. And you there have an arrow with a lead line leading to the letter A with a dash, and then "dia." thereafter. What does that refer to?

A. The illustration itself is a quarter section of the nut, and the lead line with the arrowhead and the letter A and the letters dia. indicate that

(Testimony of John N. Wolfram.)

I am trying to represent the inside diameter of the nut.

Q. And the measurements were taken of that portion of the nut against which the arrow is directed?

A. That is correct, and they are recorded in the column of the charts which is headed A. [482]

Q. And, likewise, in connection with Plaintiff's Exhibit 62 I note the letter B with the letters dia thereafter, and also an arrow and a line leading to a figure shown in section. Will you please tell us exactly what that is?

A. The arrow projects to a line which represents an extension of the corner of the sleeve head adjacent the shoulder of the sleeve, and represents, or I should say is a representation of the diameter of that corner. The actual diameters are then listed in the columns marked B in the charts.

Mr. Freeman: It is a few minutes after eleven.

The Court: Well, let's finish with these exhibits if we can.

Mr. Freeman: Very well.

Q. (By Mr. Freeman): Then do I understand that in the device, Plaintiff's Exhibit 36, there was by actual measurement before assembly of the parts a clearance between the upper portion of the sleeve and the inside wall of the nut?

A. That is correct.

Q. And I think you testified on cross-examination that that was some seven-thousandths of an inch?

A. Yes.

(Testimony of John N. Wolfram.)

Q. With three and a half thousandths on each side? A. Yes. [483]

Q. And in the physical device that has been cut, the parts at the shoulder are in engagement with each other, is that correct?

A. That is correct.

Q. And at the lower end of the sleeve or the nose end of the sleeve it is spaced somewhat from the inner wall of the nut, is that correct?

A. That is correct.

Q. And you can visually observe just what you have testified to from an inspection of Plaintiff's Exhibit 36, is that correct? A. Yes.

Mr. Freeman: I now offer in evidence as Plaintiff's Exhibit 62 and 62-A charts indicating measurements, particularly of the sleeve and nut, with respect to Plaintiff's Exhibit 36.

The Court: They may be received.

(The charts, heretofore marked Plaintiff's Exhibits 62 and 62-A, for identification, were received in evidence.)

The Court: Now we will take our morning recess. We will recess until twenty minutes after eleven.

(A recess was taken.)

Q. (By Mr. Freeman): Mr. Wolfram, will you turn to Plaintiff's Exhibit 28-Q, and particularly that reference made [484] by Mr. Huebner with respect to a pie-shaped portion, and I am going

(Testimony of John N. Wolfram.)

to ask you what would happen with respect to bearing surfaces or width of contact between the nut shoulder and the sleeve shoulder if the parts were as illustrated in the dotted line?

A. The width of contact between the shoulders of the nut and the sleeve would be materially reduced. In fact, I calculated it out on one of the sizes, and the reduction would run as much as 24 to 33 per cent.

Q. Mr. Huebner referred to that pie-shaped portion as excess, or as a person riding on the running board of an automobile, and I am going to ask you if you projected the dotted line straight on up would you then have to provide for a cut-off corner as is illustrated on that portion which Mr. Huebner referred to as the excess portion?

A. Yes, you would still have to provide that cut-off portion. It is just standard and accepted machining practice to break off sharp edges that way, unless there is some specific reason for retaining it. But in this case the standard practice for fittings calls for that corner to be broken off so that it is not sharp.

Q. So if you went up parallel with the inside wall of the nut and broke off the corner, you would actually lose bearing surface?

A. Yes, that is correct. [485]

Q. So that what Mr. Huebner failed to take into consideration was the angular broken line from the vertical broken line; correct?

A. Yes, Mr. Huebner did not, apparently, an-

(Testimony of John N. Wolfram.)

ticipate putting that angular broken line onto the sleeve head.

Q. So that, as a matter of fact, by having what has been referred to as the excess material, or the angle on the sleeve, the bearing surface is increased the distance between, as illustrated in your drawing Plaintiff's Exhibit Q, between the two vertical lines marked "Width of contact with angle" and "Width of contact without angle"; correct?

A. Yes.

Q. Will you turn to the 1,893- patent, Plaintiff's Exhibit 25?

The Court: You say 1893?

Mr. Freeman: I just used the four numbers of the patent. Some courts do that.

The Court: I thought you were talking about the year. I was just wondering.

Q. (By Mr. Freeman): You were briefly asked with respect to that patent and wherein it differed from the patent in suit, Plaintiff's Exhibit 1, by Mr. Huebner. I am going to ask you to point out as quickly as you can wherein patent No. 2,212,183, Plaintiff's Exhibit 1, differs from the 1,893-Parker patent, Plaintiff's Exhibit 25. [486]

A. In the 2,212,183 patent, the sleeve head is formed with an angle on its outer surface so that there will be free expansion at the lower end of the sleeve and a limited expansion at the upper end of the sleeve. The Parker patent 1,893,442 does not have such a sleeve head angle and does not contemplate free expansion of the lower end of the

(Testimony of John N. Wolfram.)

sleeve in combination with limited expansion at the upper end of the sleeve. [487]

Q. And the wall of the sleeve of Plaintiff's Exhibit 25 with respect to the wall of the nut is parallel; correct? A. Is 25 the 1,893,442 patent?

Q. Yes. A. Yes.

Q. So that as you begin to tighten up the nut, there is likelihood of contact between the wall of the sleeve and the wall of the nut?

A. Yes. In fact, the patent teaches that there is that contact and that the parts or the sleeve actually becomes firmly wedged against the other so that the sleeve will then react to press the flare against the nose of the fitting and cause yielding of the body seat.

Q. So that you have in the Parker 1,893,442 patent a wedge type action; correct?

A. That is correct.

Q. And in the patent in suit where you have the lower end of the sleeve free from contact with the wall of the nut, you have a gripping tension on the flare of the tube; correct?

A. That is correct. You might call this a sleeve with free suspension, or something of that nature, in that the lower end of the sleeve which engages the flare of the tube is freely suspended within the nut itself. It is not in contact with the nut.

Q. So that gripping action of the sleeve in the Parker [488] 2,212,183 patent is determined by the expansion of the sleeve itself?

(Testimony of John N. Wolfram.)

A. Yes, by the hoop tension resulting from the expansion of the sleeve.

Q. Whereas in the Parker patent 1,893,442, the nut backs up the sleeve, and thereafter the pressure applied to the flare is that of a wedge restricted on one side by the nut and on the other side by the wall of the flare? A. That is correct.

Q. Is there any indication in the 1,893,442 patent of Parker with respect to having what we have referred to here as initial contact between the sleeve and the outside wall of the flare?

A. No. The 1,893,442 patent teaches parallel seats between the sleeve and the body, that is, the sleeve surface 16 is parallel to the body surface 5. The flare itself, being a copper tube or a steel tube, slightly thins out towards its outer diameter so that the inner wall of the flare is not exactly parallel with the—so that the inner wall of the flare is not parallel with the outer wall of the flare. With this result, you would obtain initial contact or compression at the heel of the flare, rather than at the toe end of the flare.

Q. And the Parker patent, Plaintiff's Exhibit 25, No. 1,893,442, was mentioned in the Parker patent in suit in [489] the first paragraph thereof?

A. That is correct.

Q. And likewise Plaintiff's Exhibit 26, which is another Parker patent, No. 1,977,240, was likewise mentioned in the first paragraph of the Parker patent in suit? A. That is correct.

Q. And from that expression in paragraph 1

(Testimony of John N. Wolfram.)

of the Parker patent in suit, can you definitely say that both of the prior patents, Plaintiff's Exhibits 25 and 26, were before the examiner in the Patent Office?

A. They most certainly were. They were expressly pointed out.

Q. In other words, Parker, through his attorneys, called these two patents to the attention of the Patent Office? A. That is correct.

Q. Now, will you turn to Plaintiff's Exhibit 26, which is the second Parker patent, No. 1,977,240, and tell me whether or not there is any initial angle on the sleeve of the flare? I said on the sleeve of the flare. I mean on the sleeve member.

A. No. Fig. 3 illustrates the parts in their initial or finger-tight position, as mentioned in column 1, beginning with line 44. It is there stated:

"Fig. 3 is a view of the coupling members when [490] initially brought into contact with the flared end of the tube, but before said coupling members are drawn together so as to seat and finally clamp the flared end of the tube."

By observation of Fig. 3, it is clearly apparent that the side wall of the sleeve is parallel with the side wall of the nut. [491]

Q. And the Parker patent, Plaintiff's Exhibit 26, illustrates movement inwardly of the sleeve member against the flare; correct?

A. That is correct.

(Testimony of John N. Wolfram.)

Q. And that movement is in the form of an arc or arcuate movement?

A. Yes, when we consider any cross-section through the sleeve it would be an arc.

Q. And is that brought about by the angle on the shoulder of the nut coacting with the corner, if we can call it that, of the sleeve shoulder and the vertical wall of the sleeve itself?

A. Yes, plus the fact that the inside flare surface of the sleeve first contacts the flare at the heel or base of the flare, which is the opposite point of the contact established initially in the 2,212,183 patent. And since this point of contact, which is labeled with the small letter b in Figure 4, is inward of the point of contact between the nut shoulder and the sleeve shoulder a couple is set up which tends to rotate or turn the sleeve head inward.

Q. Then you fail to find in the Parker patent 1,977,240, Plaintiff's Exhibit 26, anything corresponding to the sleeve head angle that we have referred to here in connection with the Parker patent in suit?

A. That is correct, I fail to find that. The teachings [492] of the two patents are entirely different.

Q. And you likewise fail to find anything that we have referred to here in connection with the patent in suit as initial or toe contact?

A. That's correct, I fail to find such contact.

Q. I think it was your testimony that as far as you know in your experience with the Parker Company, starting back early in 1933, that the Parker

(Testimony of John N. Wolfram.)

Company made no commercial devices corresponding to Plaintiff's Exhibit 26?

A. That's correct.

Q. And it is your testimony that prior to 1940 or thereabouts the Parker Company did manufacture fittings corresponding to Plaintiff's Exhibit 25, which is the 1,893,442 patent?

A. That's correct, manufacture started in about 1940.

Q. I am now talking about Plaintiff's Exhibit 25.

A. I am sorry. I was referring to patent No. 2,212,183.

Q. So that the record is clear, your testimony now is that starting about 1940 the Parker Appliance Company began manufacturing structures embodying, well, let's call it the sleeve head angle——

A. That is correct.

Q. ——of the patent in suit.

A. That's correct.

Q. And prior to 1940 the Parker Appliance Company made [493] a fitting that has here been referred to as No. 811 fitting, following closely patent No. 1,893,442, Plaintiff's Exhibit 25?

A. Yes, and with the understanding, of course, that about in 1940 the 811 fitting was changed so as to incorporate the angle of the 2,212,183 patent.

Q. But my statement is still correct, prior to 1940 they followed pretty much the 1,893,442, Plaintiff's Exhibit 25, patent?

A. That's correct.

Q. Thereafter they incorporated the improve-

(Testimony of John N. Wolfram.)

ment of the 2,212,183 into the then existing 811 fitting? A. That is correct.

Q. And thereafter they manufactured the 811 fitting with the embodiment of the sleeve head angle of patent No. 2,212,183? A. That is correct.

Q. Reference was made yesterday to a drawing Defendants' Exhibit D, which I now hand you, and you testified in response to questions by Mr. Huebner that you made a device corresponding to that drawing Defendants' Exhibit D; correct.

A. Yes.

Q. And you furnished Mr. Huebner that particular device; correct? A. Yes. [494]

Q. I am going to ask you briefly if the device that I now hand you, which we will mark Plaintiff's Exhibit 63, for identification, is the device that you referred to when you gave your answers to Mr. Huebner?

(The device referred to was marked Plaintiff's Exhibit No. 63, for identification.)

A. Yes, this is the device.

Q. And in making up that device did you follow as closely as you could the drawing, Defendants' Exhibit D, as well as the rest of the publication which was furnished you by the defendants and referred to by defendants in their answer?

A. Yes, I did, I accurately measured out the illustration and made the fitting accordingly. [495]

Q. And did you put in a piece of lead pipe?

A. Yes, I did.

Q. What was your experience with the fitting,

(Testimony of John N. Wolfram.)

that is, the illustration that you have in your hand with respect to the lead pipe?

A. Upon making the flare in the lead pipe and bringing the parts into finger-tight position, I applied wrench pressure, and the material of the flare squashed out from between the seats again, and flowed into the undercut of a nut, so that the sleeve and the lead flare can now not be removed from the fitting, or from the nut.

Q. I am going to ask you to explain what is illustrated as the body member of the Plaintiff's Exhibit 63 and why you did not put any opening there through. Just explain the physical device you have, which is illustrative.

A. The threaded end of the body member, which is a part of this coupling, has a beveled surface, and this entire end corresponds dimensionally to the drawing, Exhibit D. It also has a hole through it, the same as shown in the drawing, and there is this undercut portion of the bore of the fitting, which lies under the threads. That can be observed by looking into the fitting.

The coupling, as shown in this Exhibit D, is obviously just for illustrative purposes, as far as the body member is concerned, since the body does not have any provision at the [496] end opposite the beveled end for connecting up to another member. I took the liberty, you might say, of adding onto this end of the fitting extra material which could serve as a wrench-gripping means, so that from the hexagon portion of this body member forward to

(Testimony of John N. Wolfram.)

the beveled portion, the fitting corresponds in all respects to the illustration. I did not have the bore drilled completely through the fitting, although it is very deep and goes through as far as the hex, so that the body part has been bored out to the extent shown in the drawing.

Q. So that the angle on the body or the tapered portion, the screw threads on the body, the screw threads on the nut, and the sleeve member, are all relatively as illustrated in Defendants' Exhibit D?

A. Yes. The only concession that might be made there is in the pitch of the threads. I don't recall exactly what the pitch works out to be in the drawing, but I selected a standard pitch thread that was the closest to the pitch of the illustration and, in fact, if I recall correctly, this isn't even a standard one, but they chased one, which made it very close to the pitch illustrated in the drawing.

Q. When you say they chased one, that means they followed it?

A. No. That means that the machinist cut a thread on the lathe with a tool bit, and not with a standard thread-cutting [497] tool, which is termed a chaser. The process of cutting a thread is often referred to as chasing a thread.

Q. I notice that the nut member includes a pair of slots or openings so that you can see the end of the lead pipe; is that correct?

A. That is correct.

Q. And that was likewise put in by you for illustrative purposes?

(Testimony of John N. Wolfram.)

A. Yes. The slots do not appear in Bjorling. I added them for that purpose.

Mr. Freeman: I want to offer the physical device referred to by the witness as Plaintiff's Exhibit 63.

The Court: It may be received.

(The device referred to was received in evidence and marked Plaintiff's Exhibit No. 63.)

Mr. Freeman: That's all, as far as I am concerned, with this witness.

Mr. Huebner: We have a few more questions, your Honor.

The Court: All right. Let's see if we can't finish up by 12:00 o'clock. I don't know what you mean by a few more.

Mr. Huebner: I don't either, until he starts answering.

Mr. Freeman: I kept my promise yesterday morning. I turned him over right away.

Recross-Examination

By Mr. Huebner:

Q. Referring to Exhibit 60, one of [498] your lead illustrations, did you have any particular reason for selecting this size fitting?

A. Yes. There was a practical reason. That was the size lead pipe that I had.

Q. There is a notation on here that you tightened this to 350 pounds torque. Is that what you did do?

A. Yes.

(Testimony of John N. Wolfram.)

Q. What pressure will a lead tube of that size and thickness stand in actual use?

A. I wouldn't know.

Q. What torque was necessary to tighten it so that there would be an effective seal in a coupling such as Exhibit 60, for what use it would be intended?

A. I wouldn't be able to tell that just from one tightening. [499]

Q. Why did you take 350 pounds torque, then, to tighten this up? It is excessive, isn't it?

A. Well, I don't know whether it is or not. I gauged that more or less by the feel of the fitting. After all, you turn a nut down even when you take a threaded bolt, and you tighten it up until you can feel the parts coming home. You develop that feel and know about where to stop.

Q. When you started out to make this experiment, what was your purpose?

A. To see what would happen if I coupled lead pipe with a Parker fitting.

Q. And what is your conclusion did happen?

A. Well, the conclusion is that the lead pipe expanded out into contact with the nut wall and jammed into the threads.

Q. That is at 350 pounds torque?

A. It had jammed before that, too.

Q. At what torque did it first jam?

A. I didn't make a note of that, but I would estimate that it had jammed by about 200 pounds torque.

(Testimony of John N. Wolfram.)

Q. But you aren't sure as to that?

A. No, I didn't make a note of that..

Q. All right. Now, take Exhibit 61; you have got a lead tube in there that is also jammed into the nut, haven't you?

A. That is correct. [500]

Q. At what point did this first jam, that is, what point of wrench torque did this first jam?

A. On that one it had been jammed at 126 inch pounds torque.

Q. All right. How much torque would be required to tighten this particular assembly of parts, Exhibit 61, to make an effective seal with a lead tube?

A. I wouldn't know that specifically or accurately from the one example.

Q. Well, your whole object was to see if you couldn't jam that lead into the threads, wasn't it?

A. No, I don't think that was the whole object. As I said——

Q. Just one of them, perhaps?

A. No. I wanted to see what would happen.

Q. Now, in performing your experiments in connection with the drawing known as Exhibit D, you have it, did you attempt to couple flared aluminum tubing with this physical assembly of parts Exhibit 63?

A. No, I did not.

Q. Why did you make this so heavy as it appears to be?

A. As I said, I followed the drawing as well as I could.

(Testimony of John N. Wolfram.)

Q. What is this hexagonal-headed item here that has on it the number "2"? [501]

A. That, as I explained before, was an extension that I put on to the fitting as illustrated in the drawing for the purpose——

Q. Where would it extend from?

A. From this end opposite the beveled surface. I added that merely to provide a wrench-gripping portion.

Q. And that is not part of the disclosure, is it?

A. No.

Q. Now, as an engineer skilled in this field, if you wanted to take that drawing, Exhibit D, and make a coupling or fitting suitable for use in aircraft, you wouldn't use brass like that, would you?

A. Brass is a material that I believe is no longer used for airplane piping, although it was at one time.

Q. Isn't aluminum or some lighter metal used, unless the strength of steel is required for the particular installation?

A. Yes, aluminum is used wherever it can be. But I can point out that with the aluminum fittings used in aircraft, a sleeve is used which is of a copper base alloy which is known as aluminum bronze or copper silicon, which we might call brass, it is very closely related to brass, it is a brass with a much higher tensile strength than brass.

Q. If you were called upon as an engineer or expert to prepare from that drawing, Exhibit D, a

(Testimony of John N. Wolfram.)

fitting suitable for [502] use in aircraft, you could do it, couldn't you?

A. If I had just this drawing before me I would produce this fitting according to the disclosure.

Q. Now, get that question. Read the question back, Mr. Reporter.

(The question referred to was read by the reporter as follows: "If you were called upon as an engineer or expert to prepare from that drawing, Exhibit D, a fitting suitable for use in aircraft, you could do it, couldn't you?")

Q. (By Mr. Huebner): Just answer that yes or no, and then if you want to give an explanation, you go ahead and give it.

A. No, I don't think that I could, because the present standard, you might say, for gauging the quality of a fitting which is required for aircraft is the AN fitting, which includes the sleeve head angle and those three zones that we spoke of, and this disclosure does not show a sleeve head angle or those three zones.

Q. I didn't say anything about standards; I said could you prepare from that drawing a fitting suitable for use in aircraft? Can you or can't you?

A. That depends on what you mean by "suitable." It is not suitable if it is to be gauged by the standards of the present fitting. [503]

Q. All right. Can you prepare one that will work.

A. Well, you are still talking about "suitable"

(Testimony of John N. Wolfram.)

when you are speaking of "work." Work by what standards? [504]

Q. Don't ask me.

A. I don't know what you want. You can make almost anything work after a fashion. You can take a piece of string and wrap it around pipe and make a tight joint for some condition, maybe a half-pound of water pressure, or something like that.

Q. Well, is it your position you couldn't make from that drawing a fitting that would perform satisfactorily in an airplane?

A. Not to the standards that are now called for.

Q. When you talk about standards, are you talking about measurements or tests?

A. Well, I am talking about the performance of the fitting.

Q. All right. What about the performance requirements? You brought it up, I didn't.

A. What about them?

Q. What are the performance requirements for fittings of this character?

A. The performance requirements for this fitting are set out in the ANF 47 specification.

Q. Well, I say, what are they?

A. That is a detailed specification.

Q. Don't you know some of them offhand?

A. Yes. [505]

Q. All right.

A. One of the requirements is that the fitting must be capable of being assembled and disas-

(Testimony of John N. Wolfram.)

sembled 15 times, not only under normal wrench pressure, but under overtightened wrench pressure. This fitting here certainly would not do that.

Q. And when you say "this fitting here," you are talking about what?

A. About the disclosure of Exhibit D.

Q. You mean you couldn't make a fitting from that disclosure that you could assemble and disassemble 15 times?

A. I don't see how you could.

Q. Why not? What is wrong with it?

A. Well, for one thing, as we found out from the sample, the lead flows out into the undercut so that you can't get it apart the first time.

Q. Supposing apart from the lead, which is not a part of the fitting, suppose you had an aluminum tube, used an aluminum tube in that drawing, Exhibit D. Then you could assemble and disassemble it 15 times, couldn't you?

A. I don't know.

Q. What is your opinion?

A. I just don't know whether you could or not.

Mr. Huebner: Your Honor, I am willing to continue, but we won't be through, I am afraid, in another five or 10 [506] minutes, the way this is going.

The Court: I don't know what the materiality of this is. I don't know what the materiality of the lead pipe is. As I understand it, it is not a question of whether this fitting is suitable for lead pipe or whether it is suitable for aluminum. It is a question

(Testimony of John N. Wolfram.)

of the fitting, not the pipe. Maybe the lead does play a part in here. I don't know.

Mr. Huebner: My point is it doesn't play a part so far as construing the patent is concerned. It is the parts of the fitting we are concerned with.

The Court: The thing I am concerned about, Mr. Huebner, is time. If you don't finish this case by Friday, it is going over to fall.

Mr. Huebner: We are unfortunately aware of that, too, your Honor.

The Court: Of course, I know that the plaintiff has taken a great deal of time to present his case and I assume the defendant could very logically say, "I am entitled to as much time as the plaintiff," and if the defendant takes as much time as the plaintiff has taken, we are not going to finish.

Mr. Freeman: I am going to ask you, your Honor, I recognize your Honor is going to a judges conference and we have the 4th of July, but we certainly like to complete the case, if at all possible, for two reasons. First, I think [507] the court is now a little more familiar with the case, both from the defendants' viewpoint and the plaintiff's viewpoint, than he will be maybe three or four months hence. Then, part of our people come from Cleveland and part of our people come from Chicago, and I am anxious to not increase the expense of travel, and time in travel, for the client any more than I have to. I still recognize the court has a calendar to follow and, of course, we will have to abide by the court's wishes, but if it is possible to go on any

(Testimony of John N. Wolfram.)

time after you get back from your judges conference, I think a day or so might clean it up.

The Court: You told me the other day you had only one short witness outside of this witness here.

Mr. Freeman: That is correct. We have some depositions, and we do have a short witness when this witness is through.

The Court: Mr. Huebner, how long is it going to take you to present your case? Are you going to take as long as the plaintiff?

Mr. Huebner: Your Honor, I hesitate to commit myself, because my words might be thrown back at me. We have three witnesses, as the case now stands. Two of them will require considerable time. The other will require a brief time. How long it will take, of course, is dependent not only on our presentation, but on the length of the cross-examination.

The Court: I notice on both sides that there has been [508] unnecessary repetition. I understand that patent cases are technical cases and you are entitled to make your record, and if you are not satisfied in presenting it one way, you can change a word or two in order to present it in another way. You have gone over and over things. I know it is pretty hard to follow, but I think there has been some time used that was not absolutely necessary. Here is our situation. You know we have got a calendar to maintain. I set a case for trial. I try to ascertain the time it is going to take. You have now had a week. You began a week ago yesterday, a week ago today. Originally, it was set for Tues-

(Testimony of John N. Wolfram.)

day and you continued it from Tuesday to Wednesday. I don't know who requested the continuance.

Mr. Freeman. No, there was no continuance.

Mr. Lyon: Your Honor set it for Wednesday way back.

The Court: I am looking at another case. Excuse me. I am looking at another case. That is right. So I allocated the time. Counsel takes more time than allocated. That always causes complications.

I will have the clerk check up this noon and see how my July 5 calendar is, but if you don't get through Friday, you will have to be here near two weeks.

Mr. Freeman: That we can take and rather enjoy. You know, after all, we are from Cleveland and Chicago.

The Court: You are on a per diem, I [509] assume.

Mr. Freeman: Your assumption is absolutely correct.

The Court: If the court holds you over here, your client can't complain very much, I don't suppose. [510]

Well, I would like to get the case out of the way. I agree with you that the matters are much more familiar than they will be sixty or ninety days from now, or even six months.

In the meantime I wish that you would see whether or not you cannot speed up the procedure just a little bit.

(Testimony of John N. Wolfram.)

Now, I think it is rather unfair for the plaintiff to say now, "Speed it up," when the plaintiff has taken all the time he has taken.

Mr. Freeman: I recognize that, and we are not going to ask the defendant to shorten their case at all, your Honor.

The Court: Well, we will recess now until 2:00 o'clock this afternoon.

(Whereupon, at 12:05 o'clock p.m. a recess was taken until 2:00 o'clock p.m. of the same day.) [511]

Wednesday, June 21, 1950. 2:00 P.M.

Mr. Huebner: Your Honor, as a measure of co-operation we are willing to waive further cross-examination of Mr. Wolfram, providing Mr. Freeman is also willing to let him step from the witness stand.

The Court: As far as I know, I think he can't help himself, because I don't think you advanced any questions. Well, you did ask some questions, too.

Mr. Freeman: We can save time. I will go along on that.

The Court: All right. Swell. You may step down. We are glad to get rid of you, finally.

I might say for counsel's information, that if the plaintiff doesn't finish their case pretty soon they will have to give me another gadget.

Mr. Freeman: Do you mean to play with?

The Court: Yes, because I have almost worn this one out.

Mr. Freeman: At this time I am going to offer the depositions of Frederick E. Amon, Jr. and Robert Henry Davies, taken before William Ferris, a notary public in and for Cayuhoga County, Thursday, May 5, 1949, on behalf of the plaintiff.

The Court: Are those the originals? [512]

Mr. Freeman: Those are the originals.

The Court: They may be opened.

Mr. Freeman. Will they be given exhibit numbers or will they be in the record?

The Court: They will be in the record.

Is it going to be necessary to read these depositions in the record, if they are already in the record?

Mr. Freeman: I am going to offer as Plaintiff's Exhibit 64 the physical specimen referred to during the taking of the Amon and Davies deposition as Exhibit 1.

The Court: It may be received.

(The device referred to was marked Plaintiff's Exhibit 64 and was received in evidence.)

Mr. Freeman: As Plaintiff's Exhibit 65, Exhibit No. 3 of the Amon deposition, a letter from the Parker Appliance Company addressed to the Assistant Chief, Materials Division, Wright Field, Dayton, Ohio, dated October 25, 1940.

The Court: It may be received.

(The document referred to was marked Plaintiff's Exhibit 65, and was received in evidence.)

Mr. Freeman: I think the defendants already have copies of the paper exhibits we are now referring to.

As Plaintiff's Exhibit 66 a set of drawings referred to in the Amon deposition as Exhibit 4.

The Court: It may be received. [513]

(The set of drawings referred to was marked Plaintiff's Exhibit 66, and was received in evidence.)

Mr. Freeman: As Plaintiff's Exhibit 67 the AN-F-366 pamphlet referred to in the Amon deposition as Plaintiff's Exhibit No. 5.

The Court: It may be received.

(The pamphlet referred to was marked Plaintiff's Exhibit 67, and was received in evidence.)

Mr. Freeman: As Plaintiff's Exhibit 68, the AN-F-47 referred to in the Amon deposition as Plaintiff's Exhibit No. 6.

Mr. Huebner: Is that a pamphlet?

Mr. Freeman: That is likewise a pamphlet.

As Plaintiff's Exhibit 69 a physical device referred to in the Amon deposition as Plaintiff's Exhibit No. 7.

The Court: It may be received.

(The pamphlet referred to was marked Plaintiff's Exhibit 68, and the device referred to was marked Plaintiff's Exhibit 69, and both were received in evidence.)

Mr. Freeman: As Plaintiff's Exhibit 70 a drawing referred to in the Amon deposition as Exhibit No. 8.

The Court: It may be received.

(The drawing referred to was marked Plaintiff's Exhibit 70, and was received in evidence.)

Mr. Freeman: And as Plaintiff's Exhibit 71 a physical [514] specimen of a fitting embedded in lucite or other transparent material, referred to in the Amon deposition as Plaintiff's Exhibit 9.

The Court: It may be received.

The Clerk: Exhibit 71 in evidence.

(The specimen referred to was marked Plaintiff's Exhibit 71, and was received in evidence.)

Mr. Freeman: I also want to offer the deposition of W. Howard Ehmann, William D. Clark, Edward M. Greer and Roland Berg, taken on May 10th and May 11th, 1949, at New York.

The Court: It may be received.

Mr. Freeman: I might say that defendants' counsel representing both the defendants here, as well as one of the defendants, attended the taking of all of these depositions.

The Court: The depositions will be received in evidence, unless there were some objections in the depositions that counsel wishes to urge.

Mr. Freeman: I am offering all the depositions, including the cross-examination, in its entirety.

Mr. Huebner: I think, your Honor, we can just

let it stand with your Honor to rule, if you would, upon any objections that appear in the transcript of the depositions as they occur. [515]

The Court: If there are any objections in the transcript that you wish to be heard upon we will hear you and rule upon them.

Mr. Huebner. At the moment, Mr. Beehler, who was the attorney present, doesn't recall anything that we need to urge.

Mr. Freeman: That is my memory, too, your Honor.

I am going to ask Mr. Wagner to take the stand.

Incidentally, your Honor, I may refer to those depositions as the case goes along, especially the deposition of Mr. Clark and Mr. Berg. They are both members of the staff of the Republic Aviation Corporation at Farmingdale, New York, and Mr. Clark was with the Service Department during the war, of Republic Aviation, who built many combat planes using these fittings, and Mr. Berg is a hydraulics engineer on the staff of Republic Aviation, and has been in that business for some twenty years or so. [516]

CHARLES H. WAGNER, JR.

recalled as a witness by and on behalf of the plaintiff, having been previously duly sworn, resumed the stand and testified further as follows:

Direct Examination

By Mr. Freeman:

Q. Mr. Wagner——

Mr. Freeman: First, Mr. Huebner, I could save considerable time if you could enlighten me with respect to the answer wherein you have said that we did not grant any rights, or that we did not make the invention available during the war. I mean, you deny that, so, of course, we are put to the burden of our proof. I have here the proof—at least, attempted proof.

Mr. Huebner: If you want to wait just a minute, maybe we can clear it up.

Your Honor, it may not be a material issue, I don't know, but there are some discrepancies in the facts related to me and I think, perhaps, Mr. Freeman should proceed.

Q. (By Mr. Freeman): Mr. Wagner, did your company grant permission generally to manufacturers of fittings or permit the manufacturers to manufacture fittings corresponding to Parker drawings?

A. They did. We granted permission, not only to fitting manufacturers, but also to the major aircraft [517] companies.

Q. Do you have a list, and will you read into

(Testimony of Charles H. Wagner, Jr.)

the record the names of some of the companies that permissions of one form or another were given to, so that they might manufacture fittings of the Parker kind?

A. Yes. I have a list that apparently was prepared in 1945, listing some of the companies to whom we had granted permission to manufacture.

The American Machine Tool Company, Dayton, Ohio.

Boeing Aircraft, Seattle, Washington.

Beech Aircraft, Wichita, Kansas.

Bell Aircraft, Buffalo, New York.

Canadian Vickers, Montreal, Canada.

Consolidated-Vultee, San Diego.

Curtiss-Wright Corporation, Robertson, Missouri.

John Deere Harvester Company, Moline, Illinois.

Douglas Aircraft, Santa Monica, California.

Incidentally, we apparently granted permission to all the Douglas plants, in Chicago, Santa Monica, Long Beach, El Segundo, and Los Angeles.

Dunbar Kapple, Chicago.

C. J. Conn, Ltd., Elkhart, Indiana.

Eastern Aircraft, Trenton, New Jersey.

General Motors Corporation, Detroit, Michigan.

Goodyear Aircraft, Akron, Ohio. [518]

Grumman Aircraft Engineering Corporation, Beth Page, New York.

(Testimony of Charles H. Wagner, Jr.)

Haverill Corporation, Los Angeles.

Hughes Aircraft, Culver City, California.

Walter Kidde and Company, Bellville, New Jersey.

Koppers Company, Baltimore, Maryland.

Lockheed Aircraft, Burbank, California.

Glenn L. Martin, Baltimore, Maryland.

Irvin W. Masters, Los Angeles, California.

McDonald Aircraft, St. Louis, Missouri.

North American Aviation at Dallas, Texas;
Inglewood, California, and Kansas City,
Kansas.

Northrup Aircraft, Hawthorne, California.

Pratt & Whitney Aircraft, East Hartford, Connecticut.

Trenton Brass and Machine, Trenton, New Jersey.

Railway and Power Engineering Corporation,
Montreal, Canada.

Wells Aircraft Parts Company, Los Angeles.

Rheem Manufacturing Company, Los Angeles.

Curtiss-Wright, Buffalo, New York.

Republic Aviation, Farmingdale, New York.

Public Service Brass Company, Huntington
Park, California.

National Brass Manufacturing Company, Rochester, New York. [519]

Kottle Manufacturing Company, Los Angeles.

That is a partial list of companies to whom we granted letters of permission.

Q. Did that list include Irvin W. Masters?

(Testimony of Charles H. Wagner, Jr.)

A. It did.

The Court: May I ask a question?

Mr. Freeman: Yes.

The Court: You say you granted letters of permission.

The Witness: Yes, your Honor.

The Court: In other words, you gave specific permission to every one of those you named?

The Witness: Yes, we wrote each one a separate letter granting them permission to make or have made the Parker Appliance parts.

The Court: Is the letter of permission to Masters a sample of the letters of permission that you gave to these other people?

The Witness: Yes, I would say that it was, your Honor. The first permission we granted was to North American, if my recollection is correct, and in that first letter we limited the manufacture to them. Later we amended it so that they could manufacture themselves or have manufactured, and that established the later pattern of having whoever got the letter be able to have manufactured for them.

The Court: You never did send a letter to Collins? [520]

The Witness: I don't recall, your Honor, whether we have or not. I don't see it on this list and, as far as I know, I would have to answer no.

The Court: My understanding of the stipulation at the beginning of the trial was that Collins got the authority from the user.

(Testimony of Charles H. Wagner, Jr.)

The Witness: It well could be. We gave North American——

Mr. Freeman: There is no stipulation to that effect. We don't know where Collins got it.

The Court: It was the statement of counsel, then, without a stipulation.

Mr. Freeman: Are you through, your Honor?

The Court: Yes.

Q. (By Mr. Freeman): Did you or the Parker Appliance Company—when I say you, that is who I am referring to—furnish drawings to any of these companies?

A. Yes, we did. We furnished drawings any time that these companies asked for them from 1941 until the end of the war. It ran into a number of thousands of drawings.

Q. Did you have any department set up for supplying drawings to other fitting manufacturers who had to manufacture the Parker type fitting?

A. It is my recollection that during this war period, we had a service department, customers service department, [521] which had between five, six, or seven people, doing nothing except getting out these prints to these companies.

Q. I hand you a report entitled "Aircraft Report No. P-151-L," entitled "Parker Type Fitting Requirements vs. Capacities," put out by the Aircraft Scheduling Unit of WPB, which on June 8, 1950, was declassified so that I would not be today violating the Espionage Act 50 USC 31 and 32. I will ask you to state just what it is.

(Testimony of Charles H. Wagner, Jr.)

A. During the war the Aircraft Scheduling Unit published reports from time to time which gave the requirements of the aircraft building program against the capacities then available for Parker type fittings. They refer to the fittings as the Parker type fittings. Briefly, they listed some, approximately, I would say, 50 companies on this, not all of whom we granted letters of permission, because I see names that are unfamiliar to me, showing the requirements of the Air Force for Parker type fittings against the open capacities of these people. This report was for the purpose of trying to find out if they had enough capacity to get fittings.

Q. Is Irving W. Masters as an individual referred to in the report that you have in your hand?

A. Yes. It says I. W. Masters, Glendale, California. It also, as a matter of interest, designates the type of fitting after each manufacturer's name, so that the ASU could [522] readily tell what type fitting the manufacturer was capable of producing.

There is a note attached to this, or a note on the sheet, which shows that the capacities were obtained from the manufacturers and represent their ability to make Parker type fittings. Then they spread out the capacities from February, 1943, to March of 1944. [523]

Mr. Freeman: I am going to offer in evidence the document entitled "Aircraft Report" as Plaintiff's Exhibit 72.

The Court: It may be received.

(Testimony of Charles H. Wagner, Jr.)

(The document referred to was marked Plaintiff's Exhibit 72, and was received in evidence.)

Q. (By Mr. Freeman): I hand you a group of letters, which we will mark for identification Plaintiff's Exhibit 73, A, B, and C, and will ask you to explain just what they are.

(The documents referred to were marked Plaintiff's Exhibit 73, 73-A, and 73-B, for identification.)

A. The first letter is a copy of a letter written by Parker Appliance Company to the Assistant Chief, Materiel Division, Wright Field, Dayton, Ohio, dated March 3, 1941, on the subject of flared tube couplings, sending to Maj. K. B. Wolfe, 811 drawings.

The letter which I think now is marked 73-A, was a letter from the War Department, Air Corps, Materiel Division, Wright Field, to the Parker Appliance Company, dated May 25, 1942, wherein they put certain interpretations on our letter of March, 1941, as to whether or not we had intended to grant them permission for the duration of the present emergency to use the Parker fittings.

The third sheet or letter, which I see is marked Plaintiff's Exhibit 73-B, is a letter from the Parker Appliance Company, signed by myself when I was assistant secretary, [524] directed to the Commanding General, Army Air Forces, Materiels Center, Wright Field, Dayton, Ohio, to the attention of

(Testimony of Charles H. Wagner, Jr.)

Col. A. E. Jones, wherein Parker granted for the duration of the present national emergency the right to make, use, or can have made for its own use, the flared tube fittings listed on Air Corps Standard Book Sheet 811, and went on to say that we hoped that cleared up all the ambiguity.

Mr. Freeman: I am going to offer in evidence the exchange of correspondence just referred to by the witness Wagner.

The Court: It may be received.

The Clerk: 73, 73-A and 73-B.

(The documents, heretofore marked Plaintiff's Exhibit 73, 73-A and 73-B, for identification, were received in evidence.)

Mr. Huebner: Do you have photostats?

Mr. Freeman: I will have for you.

Q. (By Mr. Freeman): Mr. Wagner, can you briefly here, and as rapidly as you can, give us some relative figures, either by units or dollarwise, of sales of Parker fittings of the kind here involved?

Mr. Huebner: That is objected to as immaterial, your Honor, unless it is confined to structures made under and in accordance with the patent in suit.

Mr. Freeman: I will so limit it. [525]

The Court: Do you mean made by the Parker Company or made by everybody?

Mr. Freeman: I mean made by the Parker Company. We don't know the figures that were made by others.

The Court: You had this report from the gov-

(Testimony of Charles H. Wagner, Jr.)

ernment. I was wondering whether you weren't able to use that report as to the total value of the fittings.

Mr. Freeman: I think you would need a slide rule plus a calculating machine.

The Court: Are you restricting it to the Parker Company?

Mr. Freeman: Yes. Of which he is an officer and of which he has personal knowledge.

The Court: Do you also restrict it as to time? Do you want to begin from the very beginning up to the present time?

Mr. Freeman: No, I do not. Say '42 and '43. Just give up a couple of years, and then perhaps give us last year's figures, either by month sales in dollar volume or units.

Mr. Huebner: That, your Honor, doesn't remove my objection. Of course, on cross-examination we can go into it. But that is why I am objecting. Maybe we can pin it down to what it was that was sold that represented so many dollars.

Mr. Freeman: Can we agree we are talking about AN [526] fittings, then?

Mr. Huebner: If you want to make the question that way, then that point in my objection will become a matter of argument. I still say the AN fitting is not the patented fitting. But if the question is limited to the AN, all right, I will let it go momentarily.

The Court: Will you limit it to the AN fitting?

Mr. Freeman: Yes, I will do that.

(Testimony of Charles H. Wagner, Jr.)

Q. (By Mr. Freeman): If you have figures, at least give us your best general information.

A. I am going to have to answer this way: that the figures that I examined before I left Cleveland were taken from our general ledger sales of fittings. However, they were for the years 1942 and 1943, and as far as I know from my knowledge being with the company, some of the 1943 sales might be AN fittings. In the year 1942—and, by the way, your Honor, when I speak of the year 1942 I should say that I am speaking of the company's fiscal year ending June 30, 1942, and 1943—I am very certain that most of those were the AC-811 fitting made under the 2,212,183.

Q. I will limit my question to the year 1942, to the fittings that we call the 811.

A. I will answer this way: During that fiscal year we sold fifteen million plus dollars worth of fittings, and of that group it is my opinion, after talking with our people [527] in Cleveland, and examining what few records we have, that about 80 per cent of that dollar volume represented the AC-811 fitting.

Q. And the reason you are referring to the AC-811 is because at that particular time there had not yet been the standard AN set-up, is that correct?

A. No. May I say this? I don't mean to take the court's time, because I know we are pressed, but I was familiar at that time with the WPB order, limiting order 313, which stated in so many words that subsequent to a given date in 1943—and

(Testimony of Charles H. Wagner, Jr.)

I don't remember the exact date—the AC-811 was not permitted to be used on new constructed airplanes, they must go to the AN. I would assume that by that time the AN had been a standard.

Q. What are your figures, then, for the year 1943?

A. Twenty-four million dollars worth of fittings sales, and I would again say that about 80 per cent of that represented the AC-811 or the AN.

The Court: May I ask a question?

Mr. Freeman: Yes.

The Court: Do you know or can you give us any information as to what the volume of the Parker Company was compared to the volume of the licensees? In other words, you testified in '42 you sold about fifteen million dollars worth of fittings. Did these other companies that were making fittings [528] sell as many, or more, or less, or what?

The Witness: Your Honor, I will answer that this way: I recall that our sales department, which at that time was headed by Mr. Frederick E. Amon, made studies from time to time, and it is my recollection that it was reported to me that our percentage of the over-all fitting business then available in 1942 amounted to approximately 80 per cent. In 1943 our business, of the total available fitting business, had dropped to considerably less. And in 1944 it is my recollection that we only furnished 29 per cent of the total fitting business. I am just pulling this out from past recollection of where we were going during the war years. But I think it

(Testimony of Charles H. Wagner, Jr.)

is substantially in line. From 1944 we accounted for about 29 or 30 per cent of total fitting business for the aircraft field. [529]

The Court: Well, would you say that since the war you regained your position relative to the percentage of the fitting business?

The Witness: It is our opinion, and it is mine as treasurer, no. Your Honor, we are now going just about \$200,000 a month in the fitting business, between \$175,000 and \$200,000 a month.

Q. (By Mr. Freeman): So that, as you have just stated, early, at the outset of the war, your company was manufacturing about 80 per cent of the overall volume?

A. In 1942. Prior to that time, I would say we had closer to 90 per cent.

Q. Your volume decreased as you permitted others, or your percentage of the overall volume decreased as you permitted others and furnished others with prints so that they, too, might make fittings?

A. Oh, yes. It went down substantially.

Q. As you see your business now, are you talking about 1950, 1949, or what period are you talking about when you say between \$175,000 and \$200,000 per month?

A. I am talking about the last monthly report which I saw before I left Cleveland, which would be for April, our final figures.

The Court: You are restricting your answers to fittings, aren't you? [530]

(Testimony of Charles H. Wagner, Jr.)

The Witness: Yes.

The Court: You are not including any other products?

The Witness: That is correct.

Q. (By Mr. Freeman): The overall volume in other items is way in excess of \$200,000 per month?

A. Yes. Our volume of business, your Honor, runs between seven and seven and one-half millions a year, of which fittings account for slightly less than one-third.

Q. I was going to ask you if you could quickly translate from Plaintiff's Exhibit 72 the number of fittings that you were able to make during certain given months in 1943 and 1944, just so that we can have volume of fittings as distinguished from dollar volume.

A. Well, from this exhibit, Plaintiff's Exhibit No. 72, the figures shown here, other than percentages, are pieces. When I say pieces, that is to differentiate it from dollars. In 1943, February, Parker's capacity was 9,500,000 pieces of fittings. It then went up till July, 1943, when our capacity was 12,000,000 fittings a month. Then in 1944, in January of that year, Parker's capacity was 15,000,000 fittings a month in pieces.

The Court: In pieces. Do you mean the entire fitting or do you mean the parts of the fitting?

The Witness: I think at that time, and I would say I think, they referred to parts of the [531] fitting.

(Testimony of Charles H. Wagner, Jr.)

Q. (By Mr. Freeman): So that 15,000,000 pieces would be 5,000,000 fittings?

A. Yes. Frankly, your Honor, I don't know, but I think that is the way they did it.

The Court: You used the word "pieces" and I wanted to know what you meant by using the word "pieces."

The Witness: Well, then, the sleeve would be one piece, the body another piece, and the nut a third piece.

Q. (By Mr. Freeman): Then, is it fair to say that really hundreds of millions of Parker fittings were used during the war period? A. Yes.

Mr. Freeman: Will you mark this as Plaintiff's Exhibit 74?

(The document referred to was marked Plaintiff's Exhibit No. 74 for identification.)

Q. (By Mr. Freeman): I hand you a document, which we will mark for identification Plaintiff's Exhibit 74, and I will ask you to state what it is.

Mr. Freeman: I have here a photostat of it, and I likewise have the original, and I am going to ask that we be permitted to use the photostat, although the original is available in court.

A. This is a photostatic copy of a license agreement dated July 1, 1947, between the Parker Appliance Company and [532] the Weatherhead Company of Cleveland, Ohio.

Q. Is the Weatherhead Company a long-established company in the manufacture of fittings?

(Testimony of Charles H. Wagner, Jr.)

A. Yes, it is.

Q. It has been in business, as far as you know, all the time you have been connected with the Parker Appliance Company?

A. Yes, and I imagine a good deal longer than that, although I know they were in business when I came with Parker.

Q. Is it a fact that the Weatherhead Company manufactures what we here refer to as the AN fittings? A. Yes.

Q. And is it a fact that they actually pay your company a royalty? A. Yes, they do.

Q. And can you give us just generally whatever royalty payments you have received from the Weatherhead Company?

A. Well, the royalties this past year up to the quarter ended March 31 were running approximately \$1,800 a quarter. The Weatherhead Company has not been particularly active in the AN fitting field at this time, apparently confining most of their efforts to automotive work.

Q. And the document that you have was taken from the [533] files of the Parker Appliance Company?

A. The original document was taken from the files of the Parker Appliance Company, and this is a photostat of the original.

Mr. Freeman: I am going to offer as Plaintiff's Exhibit 74 a license agreement from Parker to the Weatherhead Company of Cleveland, Ohio.

Mr. Huebner: Objected to, your Honor, as not

(Testimony of Charles H. Wagner, Jr.)

relevant or material. There is no tie-up between this document and the structures asserted to be protected under the patent in suit.

The Court: Can I ask you a question?

Mr. Freeman: Yes.

The Court: Is it your theory that you can establish validity of your patent by introducing in evidence a license agreement made by third parties?

Mr. Freeman: The license agreement, while it has to do with third parties, is always permissible to show acquiescence or recognition by others of the patent in suit, and it is permissible——

The Court: That is the only purpose it is being introduced for?

Mr. Freeman: Yes.

The Court: To show other people have——

Mr. Freeman: Have respected it. [534]

The Court: ——have respected your patent?

Mr. Freeman: That is right.

The Court: But it has no binding effect, as far as the defendants are concerned?

Mr. Freeman: If it had any binding effect, they wouldn't be in court here today.

The Court: The objection is overruled. It may be received.

(The document referred to was received in evidence and marked Plaintiff's Exhibit No. 74.)

The Court: I think counsel will stipulate, maybe, you have licensed certain manufacturers and they are paying you a royalty.

(Testimony of Charles H. Wagner, Jr.)

Mr. Freeman: I tried to get that from them, your Honor, at the outset, with respect to the government, and I was told to go ahead and do it the hard way, and I am doing it that way.

Will you mark this as Plaintiff's Exhibit 75 for identification?

(The document referred to was marked Plaintiff's Exhibit No. 75 for identification.)

Q. (By Mr. Freeman): I hand you a document, which we will mark Plaintiff's Exhibit 75 for identification, from the Parker Appliance Company to the Deutsch Company, 7000 Avalon Boulevard, Los Angeles 3, California, and will ask [535] you to state what it is.

A. This is a photostatic copy of a license agreement from the Parker Appliance Company of Cleveland, Ohio, to the Deutsch Company of Los Angeles, California, dated October 16, 1947, to which is attached a copy of a letter from the Deutsch Company to the Parker Appliance Company, correcting a date, which appears in paragraph 8 of that license agreement. Just running through this briefly, I notice it is a royalty license agreement.

Q. Have you received any money by way of royalties from the Deutsch Company in connection with its operation under that license agreement?

A. Yes, we have.

Q. And can you give us briefly the amount or at least the general figure?

A. Offhand, my recollection is that to date we have received \$3,000.

(Testimony of Charles H. Wagner, Jr.)

Q. The agreement does provide for a minimum of \$12,500 a year? A. Yes.

Q. And the agreement further provides it cannot be cancelled for a period of three years?

Mr. Huebner: The agreement speaks for itself, if you want to speed matters up, your Honor.

The Witness: Yes. [536]

Mr. Freeman: I am trying to speed it up by just asking a question or two.

I offer in evidence the agreement from the Parker Appliance Company to the Deutsch Company as Plaintiff's Exhibit 75.

The Court: It may be received.

Mr. Huebner: Same objection, your Honor.

The Court: Same ruling. It may be received.

(The document referred to was received in evidence and marked Plaintiff's Exhibit No. 75.)

Mr. Freeman: Will you mark this as Plaintiff's Exhibit 75 for identification?

(The document referred to was marked Plaintiff's Exhibit No. 76 for identification.)

Q. (By Mr. Freeman): I hand you a document marked Plaintiff's Exhibit 76 for identification and will ask you to state what it is, and perhaps you can shorten your answer by referring to the former exhibit.

A. Plaintiff's Exhibit 76 is a photostatic copy of an agreement between the Parker Appliance

(Testimony of Charles H. Wagner, Jr.)
Company, Cleveland, Ohio, and the Pacific Screw Products Corporation, Southgate, California, dated October 16, 1947, and it is similar to the license granted to the Deutsch Company, Plaintiff's Exhibit 75.

Q. And it is my understanding that the company has [537] not paid you any royalty and has not manufactured under that license; correct?

A. So far, they have paid us no royalty and have reported no manufacture.

Mr. Freeman: I offer in evidence as Plaintiff's Exhibit 76, the license agreement from the Parker Appliance Company to Pacific Screw Products Corporation.

Mr. Huebner: Same objection, your Honor, as in regard to Exhibits 74 and 75.

The Court: Same ruling.

(The document referred to was received in evidence and marked Plaintiff's Exhibit No. 76.) [538]

Q. I hand you a document entitled "In the District Court of the United States for the Eastern District of Michigan, Southern Division," entitled "The Parker Appliance Company, Plaintiff, v. V. L. Graf Company, Inc., Defendant, Final Judgment," and will ask you to state what it is.

Mr. Freeman: I am going to ask that it be marked for identification as Plaintiff's Exhibit 77.

(The document referred to was marked Plaintiff's Exhibit 77, for identification.)

(Testimony of Charles H. Wagner, Jr.)

A. This is a final judgment by the Parker Appliance Company against the V. L. Graf Company, stating that the defendant had consented to the entry of this judgment, and therefore it is ordered, adjudged and decreed that the plaintiff is the owner of United States Letters Patent 2,212,183, and all rights thereunder; and, 2, that defendant be enjoined from infringement of said letters patent; and, 3, that no costs or damages shall be awarded in favor of either of the parties hereto as against the other.

The decree apparently has been certified by the clerk on May 25, 1950, and is also signed by the Graf Company.

Mr. Freeman: I offer in evidence as Plaintiff's Exhibit 77 the final judgment just referred to by the witness Wagner.

Mr. Huebner: Objected to as irrelevant and immaterial.

The Court: I thought I asked at one time whether or not [539] there had been any decision relative to establishing the validity of this patent, and I was told there hadn't been.

• Mr. Freeman: Your Honor, I certainly didn't intend to misstate myself, if I did. I took it when you asked whether or not some court had actually passed upon the validity, that you meant by listening to all the evidence and then rendering a decision, and predicating a judgment on that decision. This is what we call in patent law, and in any other law case, a consent decree. It has little value over

(Testimony of Charles H. Wagner, Jr.)

and above the fact that the man was willing to back away and didn't face a law suit, and was willing to be enjoined from further manufacturing, so he respected the patent in the same way that a licensee respects a patent.

The Court: Although this final judgment says that plaintiff is the owner of the patent, and so forth and so on, you are not now contending that this court has determined your validity of the patent?

Mr. Freeman: When you say "this court," I take it you are referring to the judge in the District Court in Michigan?

The Court: Yes.

Mr. Freeman: No, that judge did not have before him all of the facts that your Honor has, and it would have been a misstatement on my part had I informed you that some court had actually passed upon the validity of the patent. I leaned over backwards, and I know that Mr. Huebner will [540] agree with me that my statement was a fair statement.

Mr. Huebner: I didn't find any fault with his statement. I didn't know about this consent judgment, but that is neither here nor there.

The Court: Evidently from what Mr. Freeman says, this consent judgment doesn't do anything except that the defendant is willing——

Mr. Freeman: That particular defendant.

Mr. Huebner: It indicates that he picked off a weak sister, that's all.

(Testimony of Charles H. Wagner, Jr.)

The Court: If that defendant were here in court, he might not agree with you. He just had greater discretion, rather than being a weak sister.

Mr. Huebner: Or it might be somebody that manufactured one fitting in his back yard laboratory and didn't want to fight a suit.

The Court: I want it understood that this was not a decision in which the validity of the patent had been sustained.

Mr. Freeman: That is exactly what I said.

The Court: All right. It may be admitted.

(The document, heretofore marked Plaintiff's Exhibit 77, for identification, was received in evidence.)

Mr. Freeman: You may cross-examine. [541]

Cross-Examination

By Mr. Huebner:

Q. Mr. Wagner, I don't suppose that you have personal knowledge, do you, of what the various companies manufactured pursuant to the letters of consent?

A. No, I wouldn't have personal knowledge of that. Whatever the letters showed.

Q. You are still assuming something that isn't of your own personal knowledge, aren't you, when you say that they manufactured what was referred to in the letters? A. I would only——

Q. I only want to clarify that you didn't make

(Testimony of Charles H. Wagner, Jr.)

an inspection trip and check up and see that each one of these recipients of a letter was making exactly what is talked about?

A. No, I will agree with that, I did not make any check-up of what they made.

Q. To what do you attribute the failure of Parker Appliance Company to regain its relative position in the fitting business since the war?

A. Well, I would say from the unlicensed manufacture of the Parker fitting.

Q. Has that unlicensed manufacture been widespread enough to injure your business?

A. Well, apparently. It is certainly hurting our [542] business.

Q. Who are some of the people whom you claim to be unlicensed manufacturers that hurt your business?

A. Irvin W. Master, Inc., Collins.

Q. There are a lot of others, aren't there?

A. I can think of Gideon & Ramey, Carruthers & Fernandez.

Q. Let me help suggest some names, and you tell me whether you, as an officer of Parker Appliance Company, think that these names that I will give you are persons or companies also infringing the patent in suit. How about the Sanford Company?

A. As far as I know they apparently are manufacturing fittings.

Q. And you think they are infringing the patent in suit?

(Testimony of Charles H. Wagner, Jr.)

A. I believe so. I believe we even sent them a charge of infringement.

Q. And where are they located?

A. I think in this district in Los Angeles.

Q. You mentioned the name of Gideon & Ramey; do I understand that you think they are also infringing the patent in suit?

A. As I recall, yes.

Q. Where are they located? [543]

A. In Los Angeles.

Q. What about the Rogerson Engineering Company?

A. I don't know. We may have sent them a charge of infringement.

Q. And whenever you send a charge of infringement, that is based upon information which you or your attorneys believe to justify bringing an action for infringement of the patent in suit, is that right?

A. That is correct.

Q. I think you mentioned Carruthers & Fernandez? A. Yes.

Q. Where are they located?

A. I think they are located here in Los Angeles.

Q. And your company is charging them to be infringers? A. I think so.

Q. How about the Durite Manufacturing Company?

A. Not that I know of. And the name is familiar to me only in so far as I think it was mentioned in the adverse deposition of Mr. Collins.

Q. How about the Elmore Engineering Com-

(Testimony of Charles H. Wagner, Jr.)

pany? A. I don't recall hearing that name.

Q. How about the Bird Aircraft Company?

A. That is unfamiliar to me.

Q. Airdrome Products?

A. That is unfamiliar to me. [544]

Q. Parks Manufacturing Company?

A. Parks, I think the first time I heard of that was in the taking of Mr. Collins' adverse deposition.

Q. And do you regard Parks Manufacturing Company as an infringer? A. I don't know.

Q. How about Indus. Manufacturing Company?

A. That name is unfamiliar to me.

Q. Victor Pastushian Industries?

A. Unfamiliar.

Q. Al Lamatrice?

A. I haven't heard of him.

Q. All right. Are there any others that neither you nor I have mentioned that you recall to whom or upon whom infringement notices relating to the patent in suit have been served?

The Court: Within what period of time?

Mr. Huebner: Since the termination of the war as counsel regards the termination of the war. In other words, let us say since 1946.

The Witness: Mr. Huebner, I think that the only other one that I can recall would be Aircraft Fitting Company in Cleveland, Ohio.

Q. (By Mr. Huebner): All right. Now, have you yet taken action against these others who have been notified? [545] A. We have not.

(Testimony of Charles H. Wagner, Jr.)

Q. Regarding your comment that so many million pieces of fittings were manufactured by Parker Appliance during a given period, have you any information as to whether those quantities were divided into equal parts so that there were so many million nuts, so many million sleeves, and so many million bodies, which could be assembled into a total number of fittings, one-third the number of the total pieces?

A. I have no knowledge of that, no, Mr. Huebner, I don't personally know. [546]

Q. Well, do you have this knowledge as an officer of the company, that it was the custom, at least during the war, for consumers, that is to say, aircraft companies and others, to purchase from one company one of the parts, or perhaps two of the parts, and purchase from another company or companies, the mating parts to go with what they had bought from, let us say, Parker?

A. Well, I will say this. It is my recollection that in the early days of the war, they bought all three parts from Parker. After we gave out our letters of permission, I would hazard the opinion that undoubtedly they bought wherever they could, particularly because of the problem of capacities. The machines available in some shops couldn't make certain items, perhaps a company couldn't make shapes, and the other companies could, so undoubtedly they got them wherever they could find them.

Q. Isn't it true, also, today, that Parker Appliance Company supplies certain consumers with

(Testimony of Charles H. Wagner, Jr.)

bodies only and allows the customer to do with the bodies whatever they wish?

A. Oh, yes, we sell some bodies to whoever cares to get them.

Q. And isn't it also true that even today Parker Appliance Company will sell sleeves, if sleeves are ordered separately? A. That is correct. [547]

Q. And isn't it also true that today Parker Appliance Company will sell nuts, if a customer orders them separately?

A. That is right. As a matter of fact, making sales that way out of our approximately \$200,000 worth of business, we probably sell \$25,000 a month in that fashion, and the rest of it is assembled fittings.

Q. And those that you sell as individual separate parts may be used by the customer to combine with what you charge to be infringing parts to make up a fitting, isn't that right?

A. As far as I know, they can use it with any mating parts.

The Court: May I ask a question? During the war, when you sold to the government or the Air Force or the Army or Navy, whoever it was, did you sell the fitting as a unit, or did you sell so many thousand sleeves and so many thousand nuts?

The Witness: Your Honor, my recollection is that we did it both ways. In the beginning, I think there were a number—people like Wright Field Materiel Division, when they were ordering spares, might have ordered a complete fitting, the nut,

(Testimony of Charles H. Wagner, Jr.)

sleeve, and body, but I will say this, as the war progressed and the quantities became enormous, I think that they bought sleeves and they [548] bought bodies and they bought nuts.

The Court: And they assembled them themselves?

The Witness: Yes. It is apparently the practice of the aircraft companies to want them unassembled so they can put them together.

The Court: Mr. Huebner, I notice it is 3:00 o'clock. We will take our customary afternoon recess now until 3:15.

(Recess.)

Q. (By Mr. Huebner): Mr. Wagner, the license agreement to the Weatherhead Company, Plaintiff's Exhibit 74, appears to be dated July 1, 1947, in the introductory paragraph, but over on the signature page, the photostatic copy which I have appears to have the numeral "7" scratched out and the "8" written over it in ink so that it would be apparently corrected to 1948. Do you know what the facts are? A. What is the date in 1948?

Q. It says here January 15, 1948.

A. The document is correct. It was dated as of July 1, 1947, which is the date we entered into the negotiations with the Weatherhead Company attorneys. We completed them late in 1947, and I think we did sign it in January, 1948. It took quite some time.

Q. What was the problem involved?

(Testimony of Charles H. Wagner, Jr.)

A. Opposing counsel.

The Court: That is the problem in most lawsuits. [549]

Mr. Freeman: In this particular case, your Honor, no truer statement could ever have been made.

Q. (By Mr. Huebner): Now, will you look, please, at Plaintiff's Exhibit 14, which is a letter from Parker Appliance Company to Irvin W. Masters?

A. I will, if somebody will give me a copy of it.

Q. I will do that. Is that the letter of authorization given by the Parker Appliance Company to Irvin W. Masters in connection with the war effort?

A. As far as I know, this is the only letter we gave Mr. Masters.

Q. Is that the letter which you stated to the court a little while ago is typical of the letters which you gave to others?

A. Yes. At this time, I think it was typical. I notice by looking at this that we apparently limited the consent to manufacture to Mr. Masters, to him only. There were a large number of them and I think to every single one of the aircraft companies, it was to make or have made for their use.

Q. Then the contents of the letter itself are typical of others that you sent out?

A. I would say substantially so. The purpose was to give these people permission to go ahead for the war effort all out.

Q. I would like to ask you just a few questions

(Testimony of Charles H. Wagner, Jr.)

about [550] other possible asserted infringers. Have you served notice on the Beesley Manufacturing Company of Los Angeles?

Mr. Freeman: Object to that as immaterial. Of course, if he wants to get into all these infringers, then I am going to ask the other infringers who are in court, and perhaps helping contribute to the defense of this suit, to stand so we can identify them, so under the Universal Oil decision, they likewise will be bound by whatever decision this court renders.

The Court: Mr. Freeman, you introduced certain evidence in this case showing that Parker Company had licensed certain people.

Mr. Freeman: Had given permission.

The Court: Had given permission, just for the purpose of showing that at least these people had been willing to acquiesce in the fact that the Parker Company claimed and owned the patent, and so forth, and so on. If that was proper, and evidently it is proper in a patent case, because otherwise it would have been objected or you wouldn't even have tried it if it hadn't been proper, but if that was proper, then I think it is just as proper——

Mr. Freeman: I will withdraw my objection.

The Court: All right.

Q. (By Mr. Huebner): I asked you a question about the Beesley Manufacturing Company. [551]

A. Not that I know of, Mr. Huebner.

Q. Do you know whether they are manufacturing

(Testimony of Charles H. Wagner, Jr.)

items your company claims to be infringing the patent in suit?

A. I have no knowledge of them. [552]

Q. Do you know whether the Mueller Company is manufacturing accused items?

A. Not that I know of.

Q. Do you know about the Harvey Machine Company in Los Angeles?

A. The name Harvey is familiar; I don't know in what connection, whether they manufacture Parker fittings or not.

Q. Have you served notice of infringement of the patent in suit upon the Pacific Piston Ring Company at Los Angeles?

A. It could be; the name Pacific Piston Ring I know is familiar to me. Whether we have served a charge of infringement on them or not I don't recall.

Q. Have you knowledge of what they may be manufacturing in the fitting field?

A. We served them a charge of infringement; I imagine they are making Parker fittings. But, as I say, I do not know today what they are making.

Q. Do you know that the Kohler Manufacturing Company of Kohler, Wisconsin, is advertising AN fittings?

A. Yes, I have seen their advertisements.

Q. Do you charge that company to be an infringer of the patent in suit?

A. We have done nothing as yet with Kohler Manufacturing Company. [553]

(Testimony of Charles H. Wagner, Jr.)

Q. Does your corporation, The Parker Appliance Company, regard Kohler Manufacturing Company as an infringer of the patent in suit?

A. Yes, sir.

Q. Besides those that you have been able to identify, isn't it true that there are a good many others over the country who are making parts or fittings which your corporation, Parker Appliance Company, regards as infringers of the patent in suit?

A. I will say that as far as Parker Appliance Company is concerned we believe that there are a lot of people that are apparently making our fitting. I will say the bulk of them apparently are located in Los Angeles.

Q. But there are others in other parts of the country?

A. There is one in Cleveland, Ohio; Aircraft Fittings Company.

The Court: I might say for the benefit of counsel, to carry on the thought I had a moment ago, that I don't think it is very material as far as this action is concerned to show that there are a number of people who are also making fittings and who are considered as infringers of the patent. Neither do I consider it very material to show that there are a number of people who have been licensed.

Mr. Huebner: One has about as much weight as the other.

The Court: Yes, one has just about as much weight as the [554] other.

(Testimony of Charles H. Wagner, Jr.)

Mr. Huebner: I will discontinue that line at this point. I would like now to get into another phase.

Q. (By Mr. Huebner): You have produced three licenses, one to Weatherhead and one to Pacific Screw Products, and one to the Deutsch Company. Do you receive written reports from the Weatherhead Company under that license?

A. Yes.

Q. Does the Weatherhead Company on those written reports show how many parts have been manufactured pursuant to their license during a stated period?

A. I don't know, Mr. Huebner. I think they report dollar volume of sales.

Q. Regardless of what the parts are, or how many there may be of each individual part, it is a dollar sale royalty, is that it? A. Yes.

Q. What about the Pacific Screw Products Company, how do they report?

A. The same way. They have showed nothing since the license has been in being, so they show that they manufactured no fitting, no royalties due, because no sales have been made.

Q. What is your experience with the Deutsch Company in connection with reports?

A. They show a number of fittings sold and sales volume. [555]

Q. Do you have any of those reports with you?

A. No, sir, I do not.

Q. Where are they located?

A. Cleveland, Ohio.

(Testimony of Charles H. Wagner, Jr.)

Q. Are they under your control?

A. Well, they are under the control of our comptroller.

Q. Is he above or below you in the hierarchy of the corporation?

A. He reports directly to our president, and so do I.

Q. You are on a par, then, maybe?

A. You might say so.

Q. If you were to request specimen copies, or, rather, specimens of those reports, you would be able to obtain them, I presume? A. Yes.

Q. Have you personally examined all of those reports as they come through to see what they contain?

A. No. Sometimes I don't even see them. They will go directly to the comptroller.

Q. Have you ever seen one in which the report listed a given number of parts as distinguished from a fitting assembly? A. I don't think so.

Q. You don't recall ever seeing one like that?

A. No. I can be wrong. As I say, they do not flow over my desk, of necessity. [556]

Mr. Huebner: Your Honor, I think I am almost through, but I didn't get a chance to look at letters 73-A, -B and -C, as they were on your Honor's desk, and I wouldn't touch anything there during the recess. May I look at them now?

No further questions.

Mr. Freeman: That is all for this witness.

I am going to ask Mr. Masters to take the stand.

IRVIN W. MASTERS

called as a witness by the plaintiff under Rule 43(b) of the Federal Rules of Civil Procedure, having been first duly sworn, was examined and testified as follows:

The Clerk: Your name, sir?

The Witness: Irvin W. Masters.

The Court: Are you calling Mr. Masters as an adverse witness?

Mr. Freeman: Yes, under 43(b).

Direct Examination

By Mr. Freeman:

Q. Mr. Masters, I asked you whether or not you would produce copies of letters that you forwarded to users of fittings under date of January 19, 1948, corresponding to the letter that I now hand you, and I am asking you now whether you have produced such letters.

A. I don't know, Mr. Freeman, if I have or not. I thought that we had. [557]

Q. I asked you to produce them, and you refused to produce them without being directed so to do by the court, and you are now in court and I am asking you to produce them.

A. I will. I don't have them here, though.

Q. Do you have enough identification from the letter I have given you?

A. I know what it is.

Q. Do you have the letters?

A. I do not have them here, Mr. Freeman. I

(Testimony of Irvin W. Masters.)

didn't know that I was to produce them here. I thought it was asked for in the deposition.

Q. Do you recall that upon advice of counsel you refused to make them available to me?

A. I recall there was quite a bit of argument about the propriety of it then but, frankly, I don't remember the conclusion of it.

The Court: Have you got copies of them?

Mr. Freeman: I have one of the letters.

The Court: Then maybe Mr. Masters can bring them in court in the morning. We are not going to finish this case this afternoon. You will have plenty of time.

The Witness: I will do so.

Q. (By Mr. Freeman): Do you recall that I asked you for the list of the customers to whom such letters were sent [558] out? Do you recall that? A. Yes.

Q. And can you have that likewise in the morning?

Mr. Beehler: What letter was that?

Mr. Freeman: This one.

The Court: Well, I understand that is just one letter. There are other letters besides that.

Mr. Freeman: I understand this is a form letter that Mr. Masters sent out under date of January 19, 1948. I have asked him to produce the master copy of this letter and a list of the people to whom it was sent. I understand it will be available in the morning.

Mr. Beehler: I repeat again my objection to the

(Testimony of Irvin W. Masters.)

production of that on the ground that it has no relevancy to the issue here.

The Court: Well, of course, I don't know whether it does or not. I will read it.

How is this material, Mr. Freeman?

Mr. Freeman: My next question is, who did contribute toward the defense of this case, because under the authorities they that contribute are bound by whatever decision this court may render, and we want to show exactly from Mr. Masters if he did receive contributions and from whom. They seem to know all of the so-called infringers quite well.

The Court: Do you agree that is the law? [559]

Mr. Huebner: Not quite, your Honor. If the people who contributed voiced all or part in the control of the case, yes, but if they merely put up money in a pool, I don't think they are bound by it, unless they want to go in and intervene and submit themselves to the jurisdiction of the court.

The Court: Supposing, for instance, they did contribute. Can you establish the fact in the real case in interest, or do you have to bring an independent action to show they are bound? In other words, what I am getting at is this. Supposing you do have contributors, people who put up the money, who are actually fighting this case. Can that be shown now or should it wait until after the case has been determined and then have an order to show cause issued as to why they should not be bound by the decision? They are entitled to their day in court, and even though Mr. Masters will say, "Well, John Doe contributed," is that enough?

(Testimony of Irvin W. Masters.)

Mr. Huebner: I don't believe it is enough at this point of the proceedings. I think it would be a supplemental proceeding or some different proceeding, perhaps. I haven't had to meet this point before.

The Court: Mr. Masters is going to be here, and if he can produce the letters, I would like to have those, but first I would like to have you give me a decision upholding your contention that if the other parties are held, this is the time to establish their liability. [560]

Mr. Freeman: By the very answer Mr. Huebner has given, my question is made very, very pertinent and material. In other words, if they can ultimately show that they that contributed had no control over the suit, didn't participate in any way with the conduct of the suit, then they may be on the outside of the effects of any judgment rendered by this court, but we are entitled to establish now those that contributed towards this particular defense. They may have a defense ultimately that we haven't tied them up with the conduct of this particular suit.

The Court: Well, now, the question of whether or not they have actively participated in this case is a question of fact.

Mr. Freeman: Right.

The Court: And in this particular case we are trying out the question of the ownership of the patent. I don't think we ought to get in any extra issues in this case that we can keep out. If you will bring me a case that shows that that is the way to do it, I will be perfectly willing to go along with the

(Testimony of Irvin W. Masters.)

case. Otherwise, I am going to say that is a collateral issue and it is to be determined when first we have determined the violation of your patent rights. Supposing the court would decide that there has been no infringement? Then the fact that they contributed——

Mr. Freeman: Then every one of these other defendants, [561] if we brought suit against them, would say, "We have already been charged with infringement, we helped conduct this case." They want to sit on the fence and go both ways.

The Court: I don't know whether they did, but they would probably point to this case and say the matter has been decided, that is if we are sustained by the Circuit Court. You bring me the case and I will read it and then we will pass upon that.

Mr. Freeman: We will bring you a case. We are going to ask Mr. Masters to have available in court the master letter and the list which I have required.

The Court: Mr. Masters, you bring to court this information tomorrow and then we will determine whether or not it is pertinent.

Mr. Freeman: I am going to also ask Mr. Masters to produce his copy of the letter dated April 27, 1949, addressed to Larry Cunningham, Purchasing Agent of the Republic Aviation Corporation, Farmingdale, Long Island, New York. That letter was referred to during the taking of the Masters deposition as Plaintiff's Exhibit 12-A for identification.

Q. Will you bring that letter in the morning likewise, Mr. Masters? A. Yes, sir.

(Testimony of Irvin W. Masters.)

The Court: Do you understand what letter he is referring to? [562]

The Witness: Yes, I do.

Mr. Freeman: It was Plaintiff's Exhibit 10 in the deposition and it has here been referred to as Plaintiff's Exhibit 12-A for identification.

Mr. Beehler: We repeat our objection to the production of that letter also on the ground that it is immaterial.

The Court: When you bring the letter in, after we dispose of these other matters, we will dispose of that objection at the same time. I will reserve the ruling.

Q. (By Mr. Freeman): Mr. Masters, did you report to Industrial Resources Branch and Requirements Branch of the WPB your production facilities of Parker type fittings? A. Yes, I did.

Q. Did you report as an individual or as a corporation?

A. During the period I operated as an individual, I reported as an individual. When we were incorporated, I reported as a corporation.

Q. In 1943, February of 1943, were you an individual or a corporation?

A. We were a corporation in February, 1943.

Q. Did you ever have made available to you the confidential information contained on the Aircraft Report of the Industrial Resources Branch with respect to Parker type fittings? Have you ever seen any document of the kind corresponding [563] in

(Testimony of Irvin W. Masters.)

form to the one that I now hand you, Plaintiff's Exhibit 72?

A. I would like to see it. Yes, as a member of the Industry Committee, I received copies of all this material. [564]

Q. And did you ever take exception to the fact that your name was listed as I. W. Masters, an individual, not corporation? A. No.

Q. Did you ever take any exception to the fact that reference was made to Parker type fittings?

A. No, I don't believe that I maintained any serious objection to that.

Q. Did you ever take any exception to the term "Parker type fittings—includes AN"?

A. I don't understand your question, Mr. Freeman.

Q. Did you ever take any exception to the fact that the Parker type fittings included the AN?

A. I don't believe I ever made any observation concerning that at all.

Q. But you did have reports of the kind I have given you? A. Yes.

Mr. Freeman: That is all for Mr. Masters, and as far as we are concerned Plaintiff rests its prima facie case, with the understanding that we may have Mr. Masters for a moment or two tomorrow.

Mr. Huebner: Mr. Masters will be present in court.

The Court: And may I ask you another question before you rest? [565]

In the event, and this is supposition only and I

don't want anyone to think that I am indicating as to how my decision will be, but in the event a decision would be in favor of the plaintiff, and it came down to the question of damages, you are limited, are you not, to the time the corporation was incorporated?

Mr. Freeman: Absolutely, we can't reach from the corporation. Your Honor has had considerable experience in income tax matters, and when you talk about an individual income tax, that is one thing, and when you talk about a corporation's income tax, that is another thing. One is not responsible for the other, or vice versa. And as far as we are concerned we only have, as far as this defendant is concerned, from the date of its incorporation.

The Court: I wanted to be sure that we understood that, because the consent was given to the individual and not to the corporation.

Mr. Freeman: That is correct. We can't reach beyond that.

With that statement, plaintiff rests its prima facie case.

The Court: I wanted to be sure that we understood that.

You have twenty minutes to get started in this afternoon.

Mr. Huebner: Mr. Beehler, I think, will take on from here for a while, your Honor. [566]

Mr. Beehler: Mr. Masters, will you take the stand please?

IRVIN W. MASTERS

called as a witness by and on behalf of the defendants, having been previously sworn, was examined and testified as follows:

Direct Examination

By Mr. Beehler:

Q. Mr. Masters, you are presently engaged in the manufacture of fittings; that is correct, is it?

A. That is correct.

Q. And your place of business is located where?

A. 1060 North Lake Street, Burbank, California.

Q. How long have you been engaged in the manufacture of fittings?

A. As a corporation, since October 1, 1942; as an individual, since about the middle of 1940.

Q. During that entire period the manufacture of fittings consisted of the manufacture of three-piece fittings for aircraft, is that correct?

A. Not altogether, but largely.

Q. Prior to your engagement in this business, what business were you connected with?

A. Just prior to that I had been aircraft sales and engineering representative of Flexitube Company. From the [567] middle of 1938 we manufactured flexible hose assemblies, and also we used fittings in connection with those assemblies.

Q. Then immediately prior to that were you not engaged by the government in some work in connection with fittings?

(Testimony of Irvin W. Masters.)

A. Immediately prior to that for about a year I was in general consulting engineering work and was with the Weatherhead Company for a few months in the same line of work, developing of fittings and sale to the government. Prior to that I was with the Bureau of Aeronautics, Navy Department, for a period of about three years, in the specification section.

Q. While you worked for the government what, approximately, were your duties in connection with fittings and couplings?

A. I had charge of fuel and oil line specifications, fuel tanks, oil tank specifications, and screw machine products for the Bureau of Aeronautics. The larger part of my time, however, was spent in developing a non-proprietary fitting for the use of the Navy.

Q. When you speak of a non-proprietary fitting, what do you mean by that?

A. One that was owned by the government and not subject to restrictions as to where they might buy them or have them manufactured.

Q. During that period did you or did the department [568] develop specifications for a non-proprietary fitting?

A. Yes, through a period of about a year we continued research, which had been started in 1932, to ascertain what was needed in fittings, and we established the formula and design of first the NAF fitting, and the formula that is used in the design of the AN fittings.

(Testimony of Irvin W. Masters.)

Q. What is the NAF fitting?

A. The NAF fitting is a two-piece fitting, which we refer to as a two-piece fitting. It fits on a body and has a flare and a nut, flare on the body, for the clamping of a flared tube without the use of a sleeve.

Q. Was the NAF fitting actually manufactured?

A. Yes, it was manufactured.

Q. Was it used in aircraft?

A. It was used in Naval aircraft for a period of time, and has been continued to be used in some of the older ships that are not now active.

Q. Directing your attention to the business which you are now engaged in, you manufacture, as I understand it, bodies, sleeves, and nuts, is that correct?

A. That is correct.

Q. Will you state for the record approximately what proportion of your business consists in the manufacture of bodies?

A. Currently I would say that valuewise, dollar-wise, [569] that 98 per cent of our business is bodies.

Q. The remaining portion is divided about how?

A. Well, that is a guess. I didn't anticipate this question. But I would say that half and half nuts and sleeves.

Q. When you receive orders for the parts that you manufacture, how do the orders read, with respect to the designation of the parts?

A. They are ordered by parts.

Q. By bodies separately?

A. Bodies, sleeves, and nuts, separately.

(Testimony of Irvin W. Masters.)

Mr. Beehler: Inasmuch as we will have considerable reference to certain standard specifications, I wish to offer in evidence now a set of drawings as follows:

Drawing AND 10061, AN 818, AN 819, AND 10056, AN 817, AND 10064, 811T, 811BT, 811FT.

The Court: Is there any objection?

Mr. Freeman: No. Some of these are Parker drawings; I couldn't object to them, your Honor.

The Court: They may be received.

The Clerk: As one exhibit, or individually?

Mr. Beehler: I suggest they be marked individually for convenience in identification.

The Clerk: The next is H.

Mr. Huebner: All alphabetically in alphabetical order? [570]

The Clerk: H, I, J, and K. There are four different ones here, that I have.

Mr. Huebner: There were more than that.

The Clerk: There is one here in a group. Do you want these separately here?

Mr. Beehler: Yes, I think you had better identify them separately.

Mr. Freeman: There are nine of them.

The Clerk: We will have H, and H-1 and H-2, H-3, H-4, and H-5, I, J, and K. In the group of H, there are six of them, H and H-1 to H-5, which is AND10061, AN818, AN819, AND10056, AN817, and AND10064; and we have three photostatic copies here, which will be marked I, J, and K.

(Testimony of Irvin W. Masters.)

(The documents referred to were marked H, H-1, H-2, H-3, H-4, and H-5, and I, J, and K, of the Defendants, and were received in evidence.) [571]

Mr. Beehler: If Mr. Freeman has no objection, I have three Parker drawings which I would like to also introduce at this time.

The Court: What were these first drawings? I thought they were Parker drawings.

Mr. Beehler: These are additional drawings of earlier date.

Mr. Freeman: If you will just tell me where you got the Parker drawings, which are marked "Vault Copy, Do Not Use," I will be glad to tell you whether I will let them in or not.

Mr. Beehler: These were secured by court order from the Parker files.

Mr. Freeman: You certainly can introduce them then, young man.

The Court: All right.

Mr. Beehler: I also offer in evidence the following drawings, No. 2-1835.

The Clerk: That will be L.

(The drawings referred to were marked Defendants' Exhibit L for identification.)

Mr. Beehler: No. 2-1835-1.

The Clerk: M.

(The drawing referred to was marked Defendants' Exhibit M for identification.) [572]

(Testimony of Irvin W. Masters.)

Mr. Beehler: No. 2-1835-2.

The Clerk: That will be N for identification.

(The drawing referred to was marked Defendants' Exhibit N for identification.)

Mr. Beehler: I offer those in evidence.

The Court: They will be admitted in evidence.

(The drawings referred to were received in evidence and marked Defendants' Exhibits L, M, & N.)

Mr. Beehler: I wish also to have marked for identification Defendants' exhibit next in order consisting of a drawing identified as Section No. 1.

The Clerk: That will be Defendants' Exhibit O for identification.

(The drawing referred to was marked Defendants' Exhibit O for identification.)

Q. (By Mr. Beehler): Having reference, Mr. Masters, to drawing No. AN 819, by way of example, will you explain for the purpose of the record what the designation means there in column B on the drawing where it reads "Plus $\frac{3}{1000}$ ths minus $-.000$ diameter."

A. Column B is the internal diameter of the cylindrical portion of the sleeve. The figures in that column are the basic dimensions which may not be smaller than that, but may be $\frac{3}{1000}$ ths larger on the diameter. The plus $\frac{3}{1000}$ ths means that is the tolerance of $\frac{3}{1000}$ ths of an inch. [573]

Q. Will you state for the record what is the im-

(Testimony of Irvin W. Masters.)

portance of tolerance in manufacturing drawings?

A. It is impossible to manufacture parts to 100 per cent perfection, that is, to maintain exactly a certain dimension, because of tool wear, spring in the machines, spring in the materials, so it is necessary to have certain range of dimensions which will be satisfactory, and yet the parts go together properly to be interchangeable with other parts of the same—go together properly with the mating parts and to be interchangeable with other parts of the same design.

Q. Now, will you compare tolerance with clearance and tell us what a clearance is and what the difference is between a clearance and a tolerance?

A. A clearance would be a space between two parts that are considered mating parts, but between which there must be a space in order that there will be not an interference, and the tolerance is the range of dimension that may be applied to the mating parts and yet maintain that clearance when they are assembled.

Q. Then a tolerance applies to the dimensions permissible upon a single part?

A. That is right.

Q. And the clearance as to the dimensional difference between the size of one part and the size of another [574] part, is that correct?

A. That is right. There may be a maximum clearance and a minimum clearance.

Q. Now, Mr. Masters, will you refer to the chart hanging on the blackboard there, copies of which

(Testimony of Irvin W. Masters.)

have been distributed, identified as Section No. 1.

Who was it who made the chart?

A. I drew that chart.

Q. Is the chart drawn to scale?

A. Yes. It is drawn to exact scale. The drawing hanging there is 20 times as large as the actual size of the charts represented.

Q. There are some squares on the drawing, some small squares. How many thousandths of an inch are represented by the small squares on the chart?

A. The smallest squares on the chart in the 20 to drawing represent $5/1000$ ths of an inch.

Q. And then there are some larger squares.

A. The larger squares have 10 lines each way and they are $50/1000$ ths of an inch.

Q. Directing your attention, Mr. Masters, to the green-colored portion of the chart identified by a lead line as AND 10056 standard fitting end, where did you get the dimensions for that part which you drew on the drawing?

A. I got those dimensions from the government Army [575] and Navy design drawing 10056.

Q. Directing your attention to the blue-colored part labeled AN 818 nut coupling, where did you get the dimensions that you used for that portion of the drawing?

A. I got that from the Army-Navy drawing AN 818.

Q. Referring to the red-colored portion of the drawing designed AN 819, sleeve coupling, where

(Testimony of Irvin W. Masters.)

did you get the dimensions which you used for that portion of the drawing?

A. From Army-Navy drawing 819.

Q. AN 819?

A. That is right, and AN means Army-Navy.

Q. Referring to the yellow-colored portion of the drawing labeled AND 10061 standard tube end flare, where did you get the dimensions which you used for that portion of the drawing?

A. From the Army-Navy design drawing 10061.

Q. With respect to the AND 10056 part, the AN 818 part, and the AN 819 part, it is true, is it not, that the corresponding parts which you manufactured are made to those same dimensions?

A. That is correct.

Q. With respect to the drawing, particularly the sleeve head of the part, AN 819, and the surrounding portion of the nut, AN 818, is it or is it not shown there is a clearance between those parts, particularly in the region of [576] the sleeve head?

A. There is a clearance.

Q. What is the magnitude of that clearance?

A. The magnitude of the clearance is dependent upon the diameter, but the minimum clearance at the large end of the sleeve is 50/1000ths on the diameter in the small size and 7/1000ths on the diameter in the largest size.

Q. Calling your attention to AN size 8, which I believe is the proportion in the drawing of Section No. 1, what is the tolerance?

A. The tolerance or clearance?

(Testimony of Irvin W. Masters.)

Q. Thank you. The clearance.

A. The clearance on the diameter at the large end of the sleeve, back against the shoulder, the minimum clearance is 6/1000ths.

Q. The maximum clearance is what?

A. One moment, please. The maximum clearance would be 12/1000ths.

Q. And that is a clearance before tightening?

A. That's right.

The Court: I think the clock says it is time to quit, so I think we will recess now until 10:00 o'clock in the morning.

(Thereupon, at 4:00 o'clock p.m., an adjournment was taken to 10:00 o'clock a.m., Thursday, June 22, 1950.) [577]

Thursday, June 22, 1950. 10:00 A.M.

The Clerk: Further trial.

The Court: You may proceed.

Mr. Beehler: Mr. Masters, take the stand again.

IRVIN W. MASTERS

called as a witness on behalf of the defendants, having been previously sworn, resumed the stand and testified further as follows:

Direct Examination (Continued)

By Mr. Beehler:

Q. When we recessed yesterday, Mr. Masters, we were speaking of the amount of clearance on the

(Testimony of Irvin W. Masters.)

No. 8 size AN fitting, which you said was from 6/1000ths to 12/1000ths of an inch. Will you refer, please, to the AN drawing under 818, in company with AN drawing No. 819, and point out expressly on those drawings the figures which determine those two clearances? I refer to Defendants' Exhibit H-1 and Defendants' Exhibit H-2, and I suggest for the court that you put a circle around the dimensions which you use to determine the clearances specified. Will you state, Mr. Masters, what your computation is from those figures that you use to determine those two clearances?

A. On drawing AN 818 the internal bore of the nut on the [579] 8 size is shown as 688/1000ths; on drawing 819, the external diameter of the head, that is, the sleeve head, is 682/1000ths. That is a clearance of 6/1000ths. But the sleeve head may be 3/1000ths smaller than that and the bore of the nut may be 3/1000ths larger than that indicated as the basic dimension, so the minimum clearance may be 6/1000ths and the maximum may be 12/1000ths.

Q. Then any clearance in between those figures is acceptable as a satisfactory fitting, according to the specifications, is that correct?

A. That's correct.

Q. You mentioned that this was for No. 8 size. Do the clearances vary from one size to another?

A. Yes. There isn't a very great variance. On the smallest size, which is the -2 size, the minimum clearance is 5/1000ths. On the 32 size, which is a

(Testimony of Irvin W. Masters.)

2-inch tube fitting, the minimum clearance is 7/1000ths.

Q. Will you state for the record what these numbers mean as to size; what does No. 8 mean?

A. No. 8 means that it is used on an 8/16ths tube, that would be a $\frac{1}{2}$ -inch tube. The dash numbers indicate the size of the tube in 16ths.

Q. Do the tolerances vary with different sizes of the fittings?

A. No, there is no variation in the [580] tolerance.

Q. At the toe of the sleeve of the No. 8 size, which is pictured on Section No. 1, what is the clearance there?

A. The clearance on the diameter is 12-9/10/-1000ths. The radial clearance or that shown in the illustration would be half that amount. [581]

Q. How do you figure a clearance at the toe?

A. The clearance at the toe is increased by reason of the tapering of the head. The largest diameter of the head is 10/1000ths of an inch from the shoulder of the head by reason of the 10/1000ths chamfer, and the smallest diameter on the outside of the head is 10/1000ths from the toe by reason of the 10/1000ths chamfer. So the length of the inclined portion on the head there would be 20/1000ths less than the dimension J in the drawing 819.

Then taking that dimension J less 20/1000ths would give you for the length of that line 199/-1000ths. Multiply that by the tangent of a 1 degree angle, which is .0175, to get the amount of the reduction on the radial dimensions.

(Testimony of Irvin W. Masters.)

Q. I take it, then, to find that clearance, it must be calculated rather than selected from a drawing, is that correct? A. That's right.

Q. What is the permissive variation in accordance with the drawing in the degree of the angle on the outside of the sleeve head?

A. On the AN fitting—well, on all the fittings, plus or minus $\frac{1}{2}$ degree.

Q. Will you, on the drawing AN 819, put a circle around the tolerance permitted in the angle?

A. I have done so. [582]

Q. Further, with reference to Section 1, I direct your attention to the diameter of the sleeve behind the shoulder, the small cylindrical portion of the sleeve. Will you state for the record with reference to No. 8 size, what the clearance is between the small portion of the sleeve and the surrounding portion of the nut?

A. The nominal bore of the flange portion of the nut is 570/1000ths. The nominal outside diameter of the cylindrical portion of the sleeve is 562/-1000ths. That would be a clearance of 8/1000ths at the minimum.

The outside diameter of the cylindrical portion of the sleeve might be within the tolerance, might be 3/1000ths less than that, and the bore of the flange section of the nut might be 3/1000ths more than the nominal, which would allow a maximum diametrical clearance of 14/1000ths of an inch. That would be 7/1000ths radial clearance.

Q. On Section No. 1, Mr. Masters, I direct your

(Testimony of Irvin W. Masters.)

attention to the sleeve head, and I ask you what portion of the sleeve head strikes the flare of the tubing first?

A. Well, the internal cone on the sleeve head is 32 degrees and the external conical flare on the tube is 33 degrees, so I can't say that any part strikes first. It is a surface contact.

Q. Why is the angle on the external surface of the flare of the tube made to the angle shown there? [583]

A. Well, that is the specified angle on the Army-Navy design drawing 10061.

Q. Will you place a circle around the portion of that drawing from which you take the figures that you mentioned? A. I have done so.

Q. With respect to the same drawing, AND 10061, will you also place a circle on that drawing of Fig. 1 and determine how wide the flare should be at the widest part? A. I have done so. [584]

Q. Is or is not the dimension important in the making up of the coupling? A. Yes.

Q. Why is that?

A. If it is too large, it will interfere with the inside diameter of the nut; and if it is too small, you don't get sufficient seating surface.

Q. What happens when you attempt to uncouple a coupling made with a flare that is too large?

A. It would very likely engage the threads and the nut wouldn't come off, it wouldn't slide back.

Q. Referring once again to drawing AND 10061, and calling your attention to the angles indicated

(Testimony of Irvin W. Masters.)

there at 33 degrees and 37 degrees in the sketch, tell us if you know why those particular angles were selected.

A. The angles 37 and 33 degrees were taken over in the AN designs and standardization from the NAF fitting, which was the Navy standard, prior to the adoption of the AN standard, and the purpose of the adoption of that 37 degrees in the NAF standard was to get a maximum possible holding power on the flare. This flare is out at a greater angle than the fittings which were previously used, and yet the spread of the angle was confined to an amount that was well within the ability of the materials used to elongate by that amount. The 33 degrees as against the 37 degrees is the amount of the [585] natural flaring out of the tube. As you flare the tube the thickness of the flare at any one point is just about inversely proportional to the diameter at that point.

Mr. Beehler: I offer in evidence as Defendants' O the enlarged sketch of Section No. 1.

The Court: It may be received.

(The document referred to was marked Defendants' Exhibit O, and was received in evidence.)

Mr. Freeman: Could I ascertain the amount of reduction in the photostats that you have given us and have given the court, with respect to cross-section No. 1, Defendants' Exhibit O, because when we look at the drawing and it says "Scale 20 to 1,"

(Testimony of Irvin W. Masters.)

that is an inaccurate statement as we view these drawings. So we must know the relative proportion of reduction. Otherwise these drawings evaluate very, very little.

Mr. Beehler: May I suggest that while we do not know exactly what the reduction is, the figures which are significant on the drawings are not what the pictures show, but what the figures reveal, taken in connection with the AN standard drawings.

Mr. Freeman: I don't find any figures of sizes on here at all. All I can do is look at it and determine that the scale is 20 to 1, on the one I have and the one the court has.

Mr. Beehler: We have just given testimony which directs [586] attention to specific figures, as to precisely what the distances are. Our testimony with respect to clearances gave a maximum clearance and a minimum clearance, and both apply to the drawing, and the figures given in the testimony.

Mr. Freeman: Do I understand, then, that the 20 to 1 means nothing and we are to disregard it?

Mr. Beehler: The 20 to 1 is the scale to which Section No. 1, Defendants' Exhibit O, was drawn.

Mr. Freeman: I am asking you, then, to tell me what the scale is on the one you have given me and the one you have given to the court, which will be the one we will have to work from.

Mr. Beehler: The photostatic reproduction, I do not know what the scale is.

Q. (By Mr. Beehler): Directing your attention, Mr. Masters, to colored Section No. 2, Defendants' Exhibit P.

(Testimony of Irvin W. Masters.)

(The document referred to was marked Defendants' Exhibit P, for identification.)

Q. (By Mr. Beehler): Rather, will you state for the record what drawings you used in reproducing that particular section?

A. The drawings used in producing this were the Army-Navy drawings 818, the Army-Navy drawings 819, that is AN 819, the Army-Navy design drawings AND 10061, and the Army-Navy design drawing 10056. [587]

Q. Those drawings, then, were the same as those used in connection with Defendants' Exhibit O?

A. That is right.

Q. Who made this drawing, Section No. 2?

A. I made it.

Q. To what scale did you make it?

A. The drawing is 20 to 1.

Q. What does that particular drawing represent?

A. This represents the Douglas modified sleeve wherein the heel of the sleeve has been removed by a reworking or redesign with an $18\frac{1}{2}$ -degree secondary angle. [588]

Q. What size does that particular sketch depict?

A. This is a -6, $\frac{3}{8}$ tube size.

Q. Why did you select a No. 6 size for that particular drawing?

A. Well, I don't know why I selected a 6 as against any of the others between 2 and 6, but I selected it to illustrate the condition with those sizes.

(Testimony of Irvin W. Masters.)

Q. What sizes were you at liberty to select for that particular arrangement of parts?

A. The 2, the 3, the 4, the 5, or the 6, in the copper silicon sleeves.

Q. Does that refer then only to copper silicon sleeves? A. That is right.

Q. Are there sleeves made of other metals to which that particular arrangement would not apply?

A. That is right. The steel sleeve with steel assembly would not apply to this.

Q. The steel sleeves would apply then to which of the two sections which we have referred to so far?

A. All sizes of the steel sleeves would apply to Section No. 1.

Q. That is Defendants' Exhibit O?

A. That is right.

Q. You mentioned the re-working angle as being $18\frac{1}{2}$ [589] degrees. From your examination of those figures, how much of the internal flared surface of the sleeve head is removed by making a cut of $18\frac{1}{2}$ degrees as set forth in the specifications and as represented on the drawing?

A. About 50 per cent. That is 50 per cent of the original internal flare, referring to Section 1 as the length of the original internal flare.

Q. With respect then to the contact of the sleeve head of the No. 6 size with the flare of the tubing, what portion of the sleeve head strikes the flare first?

A. The contact between the sleeve and the flare

(Testimony of Irvin W. Masters.)

on the tubing on the 6 size would run from the end to about from 20 to 30 thousandths of an inch from the end.

Q. What proportion of the available surface of the sleeve on the 6 size strikes the flare on the tubing first?

A. Well, about a third of the distance back to the heel that now remains after the modification would be in contact. Areawise, it would be slightly less than that, I believe.

Q. And that area is about half of the initial area before the cut-off, I believe you said?

A. That's right.

Q. Adjacent what part of the flare does that area strike?

A. It strikes a little both sides of the midsection [590] of the flare, I believe; slightly more toward the outer side of the midsection of the flare.

Q. Have you made a determination, Mr. Masters, of the clearance between the largest portion of the sleeve head of the No. 6 size depicted on Defendants' Exhibit P and the surrounding wall of the nut?

A. Yes, I have.

Q. Will you state what the clearance is?

A. Do you mean a physical measurement?

Q. The physical measurement taken from the AN specification and before tightening.

A. One moment, please. At the large diameter of the head, the minimum clearance is 6/1000ths. The maximum clearance is 12/1000ths.

Q. Will you, on the same AN drawings 818 and

(Testimony of Irvin W. Masters.)

S19. encircle the figures which you used to make the determination that you just gave in your last answer.

A. I have done so.

Q. We have referred here, Mr. Masters, to AN specifications. Will you tell the court where those specifications originated, if you know?

A. Well, they are specifications that have been agreed upon by the Army and the Navy for materials that are used by both services interchangeably.

Q. Were they determined by any single body, or were [591] they the joint determination of many persons and factions?

A. They were the joint determination of many persons in many conferences over several years.

Q. How were clearances arrived at in the Army-Navy specifications?

A. The tolerances follow standard engineering practices as are employed throughout the other industries. These happen to fall in the range that are called class 3 fits here.

Q. How were clearances arrived at in the Army-Navy specifications?

A. The necessary clearances, I believe, were conclusions of years of experience as to what worked well and what did not. [592]

Q. How were angles arrived at in the Army-Navy specifications?

A. As previously testified to, the angles on the flare followed the angles set up in the Navy standards called the NAF fitting. The Navy, in the first

(Testimony of Irvin W. Masters.)

place, had cognizance of fitting design and development under the Army-Navy standardization program.

Q. How was the selection of threads arrived at in those same specifications?

A. The decision upon the threads was the same, they followed the same threads, I believe, throughout, with one or two exceptions, that were employed in the NAF fitting. But those threads in the NAF fitting were standard threads, class 3 standard, throughout the industry.

Q. Is there any Army-Navy specification with regard to the torque that should be used on fittings of that description? A. Yes, there is.

Q. How was that arrived at?

A. I have no direct personal knowledge of the steps that were taken to arrive at those exact figures, but there was a great deal of trouble with over-torquing of fittings throughout the years, and I presume that it was necessary to set up values to make the fittings work satisfactorily.

Q. In your testimony yesterday, Mr. Masters, you [593] mentioned a non-proprietary fitting. What bearing does that have, if any, upon the Army-Navy fitting?

A. The Army-Navy procurement program was very much hampered at different times by limited sources of items which were much used by the Army and Navy, and there was a concerted effort over many years to develop standards which could be bought in the open market without restricted sources.

(Testimony of Irvin W. Masters.)

Q. Is or is not the Army-Navy standard fitting, then, in your opinion, a non-proprietary fitting?

A. It is.

Q. In our discourse, Mr. Masters, we have had much reference to the details of construction of the fittings of this kind, and there has been conversation as to whether or not you, as a manufacturer, supply an assembly with or without the tube. Will you state just very briefly for the record how these three parts are put together on a tube in order to arrive at the arrangement illustrated there in Defendants' Exhibit P, for example?

A. At the place where the fitting is used the tubing which is connected by the parts or couplings is cut to the desired length, and very often bends are made in it to enable them to connect the parts as they are located in the ship or equipment that the tube is going in, and very often they have to be bent several places to go around various [594] pieces of equipment that lie between, for instance, the engine that they may want to connect, with a supply of fluid from some other point. After cutting the tube and making the necessary bends and making the ends of the tube smooth, the nuts are slipped on each end of the tube, one nut on each end, then the sleeve is slipped on and the flare made.

Q. What do you use to make a flare customarily?

A. Well, in plants where considerable production is under way they have flaring machines, which have a conical pin, the angles on which are the same as the internal angle on the flare, and that operates

(Testimony of Irvin W. Masters.)

in a machine which rotates the axis of the pin, causing an eccentric movement inside the tube, and outside the tube is a split die, and the tube is flared out against that die by the eccentric rotating pin.

Q. Utilizing machines of that kind is there or is there not any appreciable variance in the angles produced on the flares made by them?

A. There is not any appreciable variance in the angles made in a given set of tools.

Q. Are there any tools other than the machine flaring tool that you mentioned used for that purpose?

A. Yes, there are hand flaring tools which are in different forms, but essentially the same thing. They are usually a pin that is simply hammered into the end of the [595] tube to form the flare.

Q. Is there or is there not any variance in the resulting flare made by tools of that description?

A. There is expected to be more variance in the diameter, but not in the angles.

Q. After the flare has been made on the tubing in the example which you have been describing, what is the next thing done in order to complete the fitting assembly?

A. Then the nuts are screwed on the bodies which are secured in the pieces of equipment that are desired to be connected.

Q. How does the mechanic know how hard to screw the nut on the body?

A. There are specifications which the government has issued showing the twisting effect or torque that

(Testimony of Irvin W. Masters.)

is necessary to make a good seal and yet not damage the fitting.

Q. Is that twisting effect the same, or not the same, for tubing of different metal characteristics?

A. Usually a higher torque, or always a higher torque is used on a steel tube than on an aluminum tube. The practice is not perfectly uniform in that respect. Some companies who are users of fittings torque the steel fittings much tighter, to a greater magnitude, than do others. [596]

The Court: May I ask a question? A mechanic putting these fittings together, how is he to know when he has reached the proper torque?

The Witness: Well, your Honor——

The Court: By feel alone?

The Witness: No. They have calibrated torque wrenches. We have some here, if you would like to see them. There are two different kinds that I am familiar with. One torque wrench has a dial on it, which indicates by the position of the hand how hard he is turning it. The other that I am familiar with clicks when it reaches the desired torque.

The Court: The wrench itself indicates, rather than the feel of the operator?

The Witness: Yes.

Q. (By Mr. Beehler): Without a torque wrench handy, what would determine how tight the mechanic might screw the nut on the body?

A. His judgment entirely.

Q. Referring once again to Section 1, Defendants' Exhibit O, in your observation, what happens

(Testimony of Irvin W. Masters.)

at the large end of the sleeve when the coupling is coupled together, using a recommended torque?

A. Well, it expands very little. Often it expands not any measurable amount. At the shoulder, you are asking. [597]

Q. Does it expand enough to take up the tolerance initially provided?

A. I have not found it to do so.

Q. Is your answer the same or different with respect to colored Section 2, Defendants' Exhibit P?

A. That's right, it is the same.

Mr. Beehler: Will you mark this as Defendants' Exhibit Q for identification?

(The document referred to was marked Defendants' Exhibit Q for identification.)

Q. (By Mr. Beehler): I wish to call your attention to another colored section, colored Section No. 3, which I have requested be marked Defendants' Exhibit Q, and I ask you, Mr. Masters, who made that particular drawing? A. I made it.

Q. Where did you get the information which you used in making that drawing?

A. The blue section is the nut. That was made from the current Air Corps 811 BT drawing.

The red section is the sleeve. That was made from the current Air Corps 811 T drawing of the sleeve.

The green section, which represents the fitting end, was made from the Air Corps 811 fitting drawing. These are to a -8 size.

The flare on the sleeve, I took from page 82 of

(Testimony of Irvin W. Masters.)

the [598] Parker's 1943 installation manual, which shows the angles for flaring sleeves, or for flaring tubes.

Q. In the No. 8 size, which you selected and of which this is a drawing, will you, by reference to the AC 811 drawings, read the figures which you used to determine the clearance between the large end of the sleeve and the interior wall of the nut?

A. These are kind of fine. I might have to use my magnifying glass here. These are on the BT nut. The F dimension is the bore of the nut.

On the 811 T drawing, the G dimension on the outside diameter of the sleeve head, the outside diameter of the sleeve head is given as 682/1000ths and the inside diameter of the nut is given as 690/1000ths. The inside diameter of the nut—

Q. That, then, is a nominal clearance of 8/1000ths, is that correct? A. That's right.

Q. And the maximum and minimum clearance—

A. Pardon me, Mr. Beehler. There is 3/1000ths clearance nominal.

Q. The maximum and minimum clearance then for that particular size would be what?

A. There is a 3/1000ths tolerance on each part, which would give a maximum clearance of 6/1000ths more than [599] that just stated or a maximum clearance of 13/1000ths.

Q. In your experience, in tightening assemblies of this particular kind, what has been your observation with respect to the extent of expansion of the sleeve head at the large end?

(Testimony of Irvin W. Masters.)

A. It is practically nil.

Q. In your experience, has there ever been enough to fill the nut within which it is contained?

A. Only when excessively over-torqued.

Q. With respect to specified torques, it would not expand, then, is that correct?

A. Not in my experience.

Q. Directing your attention to the internal flare on the sleeve head of the colored Section No. 3, Defendants' Exhibit Q, in your opinion, what part of the sleeve head strikes the flare on the tube first?

A. The heel of the internal bore of the sleeve strikes the base of the flare first.

Q. And adjacent what portion of the flare does the heel strike?

A. At the smallest diameter of the flare.

Q. And by reference to the drawing 811—drawing for the sleeve—can you determine from an inspection of that drawing when the sleeve head angle was added?

A. No, I cannot tell just what day it was added in [600] this drawing. There are three changes shown on the drawing, '41, '42, '43. [601]

Q. What is the usual practice with regard to changes in drawings?

A. Well, I don't believe, Mr. Beehler, that practices are uniform. In working drawings changes are noted on the drawings, and they refer to change notices. This is not clearly revealed here just what the changes were; it simply states the dates changes were made.

(Testimony of Irvin W. Masters.)

Q. Then, it is true, is it not, that the figures on the drawing may not necessarily represent the drawing as it was at the date the drawing was initially drawn, as indicated in the title blocks appearing on the drawing? A. That's true.

Q. Do you have any knowledge, Mr. Masters, of where the AC-811 sleeves might be used today in aircraft work?

A. Well, the only knowledge that I have is among my customers.

Q. Do you know any airplanes that use the AC-811 fittings?

A. The Constellation and the P-38 made by Lockheed still use 811 bodies and nuts, but they do not always use 811 sleeves.

Mr. Beehler: I offer in evidence as Defendants' Exhibit Q the colored section No. 3.

The Court: It may be received. [602]

(The document referred to was marked Defendants' Exhibit Q, and was received in evidence.)

Mr. Beehler: Will you mark for identification another colored section, captioned No. 4, as Defendants' Exhibit R?

(The document referred to was marked Defendants' Exhibit R, for identification.)

Q. (By Mr. Beehler): Mr. Masters, who made the colored section, Defendants' Exhibit R?

A. I made that.

Q. What scale was that made to?

(Testimony of Irvin W. Masters.)

A. May I look at the drawing closely? I am not sure.

Q. Surely.

A. Some I made to different scales.

(Witness approaches exhibits.)

The Witness: That was 20 to 1.

Q. (By Mr. Beehler): What kind of a fitting was that intended to represent?

A. This represents an 811-6 copper silicon sleeve assembly.

Q. Where did you secure the information which you used to make the drawing of the green section there indicating the body?

A. I used the 811ET body detail.

Q. What did you use for the representation of the nut? A. The 811BT drawing. [603]

Q. And for the representation of the sleeve?

A. The 811T drawing.

Q. And what figures did you use in order to draw in the representation of the flare on the tube shown in yellow?

A. I used the figures from Parker's Manual of Maintenance of Aircraft Tube Assemblies, the figures on page 82, and the outside angle was not shown there, so I ascertained that from computation which I confirmed by reference to the Lockheed Manual.

Q. The parts of the coupling as they are shown are in untightened condition, are they?

A. That is right.

(Testimony of Irvin W. Masters.)

Q. What is the clearance which you found to be the case in that assembly between the largest end of the sleeve head and the surrounding wall of the nut?

A. 7/1000ths minimum; 13/1000ths maximum.

Q. Have you had any experience in tightening couplings of that particular sort?

A. Yes, I have.

Q. What did you find to be the expansion at the large end of the sleeve of the couplings after being tightened in accordance with recommended torque?

A. Mr. Beehler, I do not have the figures here for the 811 6 size.

Q. Was the expansion enough to fill the inside of the [604] nut? A. No, it was not.

Q. Directing your attention now, Mr. Masters, to the free end or small end of the sleeve, what portion of the sleeve strikes the exterior of the flare on the tubing, first?

A. Well, the first contact of the sleeve on the outside of the flare would be a line contact at the juncture of the two cones which are on the inside of the sleeve.

Q. And that is adjacent what portion of the flare on the tubing?

A. By this scale it would be less than half the distance up the flare from the base.

Q. That will be adjacent the outside end, or the inside, end, or the middle?

A. It would be adjacent the middle of the flare, but nearer the inside end than the outside. [605]

(Testimony of Irvin W. Masters.)

Q. Are you aware, Mr. Masters, of any permitted mixing of the parts of the AN fittings with the 811 fittings?

A. Yes. There is considerable interchangeability permitted. I wouldn't remember in the different sizes, because it is quite mixed up. Generally speaking, however, AN flares and sleeves are used where substitution is required, but they may use the AN sleeve, and do extensively, and AN flares, with AC bodies and nuts.

Q. I call your attention, Mr. Masters, to a manual captioned "SAE Aeronautical Information Report No. 1," dated January 1, 1943, and I would like to read a brief section of that from page 1, column 2:

"B, sleeve nuts. The AN817 sleeve nut is interchangeable with the AN818 nut and AN819 sleeve combination. However, tests show that the nut and sleeve combination will permit closer tube bend, more repeated disassembly and reassembly, and more wrench torque.

"C, nuts. The 811 BT 2, 3, 4, 28, and 32 nuts can be used on the AN standard fittings. The AN818 nuts are slightly larger and therefore cannot be used on the AC811 series fittings."

Do you subscribe to that recommendation of interchange of parts? [606]

A. Generally speaking, it is considered inadvisable for the reason that while some interchange is possible, it is hardly feasible for even one quite

(Testimony of Irvin W. Masters.)

familiar with the fittings to remember which may be interchanged. It is recommended that where possible the parts of a single series should be used.

Q. Directing your attention once again to colored Section No. 4, do you know any place in the aircraft industry where that combination is used?

A. Yes. This particular 6 size of the AC811 fitting has such an acute angle, as compared with the AN fitting, that it is—where the AC 6 bodies and nuts are used, they must use the AC flare and the AC copper silicon or aluminum bronze sleeve.

Q. There was mention in that suggested combination an AN817 sleeve nut. Can you tell us about what kind of a nut that is?

A. The AN817 is a nut and sleeve combined. That is the one we commonly refer to as being used with a two-piece fitting. It is a nut with an elongated smaller portion or neck, which has a conical surface internally between the threaded portion and the cylindrical portion of the extended sleeve. The sleeve and nut combined is what it is.

Q. Do you recall in connection with the 817 sleeve the pitch of the flare on the inside of the nut?

A. Yes. It is 33 degrees. [607]

Q. Do you recall what the pitch of the angle is on the nose of the body, which is regularly used with that nut?

A. That is 37 degrees.

Q. Is or is that not in your opinion a differential angle?

A. That is my understanding of what is meant when differential angle is referred to.

(Testimony of Irvin W. Masters.)

Q. In coupling together an 817 nut with a body wherein the angles have the relationship which you just recited, what portion of the flare on the inside of the nut would strike the flare on the tubing first?

A. There I can't say that any part strikes first. It is a surface contact. The inside cone of the nut is 33 degrees. The outside cone of the tubing flare is 33 degrees. So it would be a surface contact. You can't say any particular part of the flare would touch first.

The Court: Mr. Beehler, before you proceed any further, I think we will take our morning recess. We will recess until 20 minutes after 11:00.

(Recess.) [608]

Mr. Beehler: I note we have not offered in evidence Defendants' Exhibit P, which I wish to do at this time. I offer it in evidence.

The Court: It may be received.

(The document, heretofore marked Defendants' Exhibit P, for identification, was received in evidence.)

Mr. Beehler: I wish, also, to offer in evidence Defendants' Exhibit R.

The Court: It may be received.

(The document, heretofore marked Defendants' Exhibit R, for identification, was received in evidence.)

Mr. Beehler: Mr. Freeman this morning asked about the reduction in size of the small copies of

(Testimony of Irvin W. Masters.)

the large exhibits which we have talked about. We have measured them and find that they are practically one-half the size of the larger one; and, also, by reference to the little squares on the exhibit in evidence, the little squares were testified by Mr. Masters as having a dimension of 5/1000ths of an inch. Am I correct? And the same squares on the copies will then also represent 5/1000ths of an inch.

Mr. Freeman: So that actually the proportions, while you said one-half, it is really one-quarter scale; 50 per cent reduction in a photostat makes it one-quarter scale, 5 to 1. Is it still 10 to 1?

Mr. Beehler: 10 to 1 on the smaller one. [609]

The Court: At least I understand that the big drawing is on a 20 to 1 basis?

Mr. Beehler: Yes.

The Court: And these little drawings that you have given me are about half?

Mr. Beehler: They work out about 10 to 1.

The Court: All right.

Q. (By Mr. Beehler): In order that the record, further, may be clear with respect to Section No. 2, will you state again, Mr. Masters, differentiate between tolerance and clearance, what you said about the expansion of the large end of the sleeve head and its relation to the nut?

Mr. Freeman: May I suggest that we use Defendants' numbers because color-section or cross-section No. 2 is down in the corner, and it is not intelligible in our photostats.

Mr. Beehler: Fine. Defendants' Exhibit P.

(Testimony of Irvin W. Masters.)

The Court: What was the question, again?

(The question referred to was read by the reporter as follows: "In order that the record, further, may be clear with respect to Section No. 2, will you state again, Mr. Masters, differentiate between tolerance and clearance, what you said about the expansion of the large end of the sleeve head and its relation to the [610] nut?"')

The Witness: Tolerance represents the difference which is permissible between the largest diameter and the smallest diameter of any particular part. When the parts are assembled there initially must be a clearance between the parts. The minimum clearance would be when the internal part is at the largest tolerable diameter, and the external part is at the smallest tolerable diameter. The maximum clearance would be when the internal part is at the smallest tolerable diameter, and the external part is at the greatest tolerable diameter.

Q. (By Mr. Beehler): What, then, did you find the clearance to be in Defendants' Exhibit P at the large end of the sleeve?

A. 6/1000ths—did you ask the clearance?

Q. Clearance, yes.

A. 6/1000ths was the minimum clearance, and 12/1000ths, the maximum clearance, at the large end of the sleeve.

Q. Further, to be certain that the record is correct with respect to Defendants' Exhibit Q, when

(Testimony of Irvin W. Masters.)

you referred to the clearance between the sleeve and the nut, which end of the sleeve did you have reference to?

A. I believe on that part we discussed only the clearance between the nut and the sleeve at the largest end of the sleeve. [611]

Mr. Beehler: I offer for identification Defendants' Exhibit S, a tabulation of figures representing certain test results.

The Clerk: Exhibit S for identification.

(The document referred to was marked Defendant's Exhibit S for identification.)

Q. (By Mr. Beehler): Mr. Masters, have you on occasion made tests in order to determine the precise expansion of sleeve heads of the AN series of fittings? A. I have.

Q. Will you describe briefly for the court how the arrangement was made in order to conduct the tests which you ran?

A. In order to ascertain the amount of expansion of the sleeve when assembled and tightened to varying torques, we drilled a nut of the assembly at different points to drill holes across to observe hexes. One was at about the approximate midsection of the sleeve head. The other was about 1/64th of an inch of the end of the sleeve. The other one was within 1/64th of an inch of the hole of the sleeve.

Then we assembled the sleeve and the nut on a piece of flared tubing and screwed it on to the

(Testimony of Irvin W. Masters.)

mating body finger tight and explored through the small holes with what we call a needle micrometer to ascertain the diameter of the sleeve [612] originally.

I wonder if I might have that needle micrometer off the desk there.

(Mr. Beehler handing article to the witness.)

A. Thank you. The needle micrometer penetrates the holes drilled, which are very small holes, and we measured the dimensions in those three different very narrow zones to ascertain the original diameter at the various points of the sleeve, and then after wrenching them up to a specified torque, measured again to see how much expansion there was.

Q. For the record, referring to the tabulation of results, will you identify those points which you measured by letter?

A. The dimension A is the diameter within $1/64$ th of the shoulder of the sleeve head or closer; the dimension B was the diameter about midsection of the sleeve head, a little closer to the free end than to the shoulder. The section B was as near as we could measure to the end of the sleeve head. The reason——

Q. You mean the toe end?

A. At the toe end. The reason I took it $1/64$ th from the end is that $1/64$ th of an inch is only slightly over $15/1000$ ths and there is a chamfer on each end of $10/1000$ ths, which we needed to avoid.

Q. How did you mount these parts in order to conduct the tests? [613]

(Testimony of Irvin W. Masters.)

A. On these tests with the holes in the nut, we simply clamped the body, hex of the body, in a vice, and gripped the nut in a torque wrench and pulled the torque wrench to the calibrated torque.

Q. In tightening up those specimens which you used for testing, what torques did you apply?

A. In most instances, we used the specified number torques, namely, 200 inch pounds or pound inches on the -8 dural size, and we twisted some at higher torques to determine what would happen.

Mr. Beehler: I offer for identification Defendants' exhibit next in order, consisting of a blank sheet.

The Clerk: Defendants' Exhibit T for identification.

(The blank sheet referred to was marked Defendants' Exhibit T for identification.)

Q. (By Mr. Beehler): Will you explain, Mr. Masters, what that sheet was?

A. That was simply a working sheet that I used when conducting these tests for convenience. At the top it says "Test to Ascertain the Amount of Expansion and Places at Which Expansion Occurs When Sleeve Is Pressed Onto Flare at Specified Wrench Torque." [614]

Q. Did you keep a sheet like that for each test specimen? A. I did.

Q. You mentioned the exploration holes which you used in connection with the needle point micrometer. Was there some other test method which you used in conjunction with those test runs?

(Testimony of Irvin W. Masters.)

A. Yes, there were a few tests I have conducted simply by pushing the parts together so that the sleeve head could be out in the open, so we could see it completely. We mounted two blocks in a vice, one had recesses into which we could screw the bodies with the nose pointed inwardly, and the other block was opposed simply so that we could press the sleeve on with a nut of the same pitch that is used in the assembly.

Q. Do you mean pressed the sleeve on the flare?

A. On the flare of the body.

Q. With the flare against the body?

A. With the flare against the body, with the sleeve situated outside the flared tube so that we could see what happened to the sleeve out in the open.

Q. And under the last defined method there was nothing at all to restrict the expansion of the sleeve head, is that correct?

A. That is correct. [615]

Q. Among the specimens which you selected for testing, what did you do to determine the dimensions before they were assembled? How were they selected, in other words?

A. Well, they were selected at random from stock, but we were careful to get only sleeves and parts that were within the tolerances.

Q. Whose manufacture were the parts which you tested?

A. Well, some of them were Parker's manufacture, some Weatherhead, some Masters.

(Testimony of Irvin W. Masters.)

Mr. Beehler: I offer in evidence as Defendants' Exhibit next in order test specimen No. 1.

The Clerk: Exhibit U.

Mr. Beehler: As Defendants' Exhibit U.

The Court: It may be received.

(The device referred to was marked Defendants' Exhibit U, for identification.)

Q. (By Mr. Beehler): Will you by reference to the tabulation of results describe what happened when the test was run on Defendants' Exhibit U?

A. This assembly was pushed on by the second test method which I described, with a wrench torque of 200-inch pounds, and the results were that in the A zone, that is the zone adjacent the shoulder, there was an expansion with 200-inch pounds of $3/10,000$ ths of an inch; the B zone there was an expansion of $2\frac{1}{2}/1000$ ths of an inch, that is [616] in the mid-section of the sleeve head; and at the toe end, or as near as I could get to the toe end, the outside diameter of the sleeve expanded $2/1000$ ths.

Q. Was the expansion at the A zone sufficient to fill the inside of the nuts which are specified for use with sleeves of that dimension? A. No.

Mr. Beehler: I offer for identification Defendants' Exhibit next in order, Masters' test specimen No. 2.

The Clerk: V.

The Court: It may be received.

(The device referred to was marked Defendants' Exhibit V, for identification.)

(Testimony of Irvin W. Masters.)

Q. (By Mr. Beehler): With respect to specimen No. 2, will you describe the test which was run on that?

A. That test was made by assembling the parts in the conventional manner, namely, with a flared tube and the sleeve, the nut, screwed onto the body, and we made the measurement through the exploration holes that I have described. The torque applied was, likewise, 200-inch pounds, and the expansion in this instance was, at or near the shoulder, $5/10,000$ ths of an inch; in the mid-section, it was $2/1000$ ths of an inch; and at or near the nose it was $2/1000$ ths of an inch.

Q. By that method of testing, then, was the expansion at [617] the large end of the sleeve enough or not enough to fill the surrounding nut?

A. It was not enough to fill the surrounding nut.

Mr. Beehler: I offer in evidence as Defendants' Exhibit next in order the physical specimen, Masters' test specimen No. 3.

The Clerk: W.

The Court: It may be received.

(The device referred to was marked Defendants' Exhibit W, for identification.)

The Court: Mr. Beehler, you are offering some to be marked as an exhibit, and you are offering some in evidence, but I assume you want them marked as exhibits?

Mr. Beehler: I would like to have them marked as exhibits, and then I will offer them in evidence at one time.

(Testimony of Irvin W. Masters.)

The Court: Just to keep the record clear, then, they are being marked for identification only.

Q. (By Mr. Beehler): What were your findings, Mr. Masters, with respect to test specimen No. 3?

A. Test specimen No. 3 was, likewise, assembled as No. 2, and torqued to 200-inch pounds, and on that specimen there was no measurable expansion at the shoulder; there was two and a half thousandths expansion in the mid-section; and there was one and one-quarter thousandths expansion at the end of the sleeve. [618]

Q. At the toe end, do you mean?

A. At the toe end of the sleeve.

Mr. Beehler: I offer for identification Masters' test specimen No. 4 as Defendants' Exhibit next in order.

The Clerk: X.

The Court: It may be so marked.

(The device referred to was marked Defendants' Exhibit X, for identification.)

Q. (By Mr. Beehler): You tested, I presume, specimen No. 4, Mr. Masters?

A. Yes; but I found in that that the end holes were too near the ends of the sleeve head to get an accurate measurement either originally or [619] after.

Mr. Beehler: I offer now for identification Masters' specimen No. 5 as Defendants' Exhibit next in order.

(Testimony of Irvin W. Masters.)

The Court: It may be marked.

The Clerk: Defendants' Exhibit Y for identification.

(The article referred to was marked Defendants' Exhibit Y for identification.)

Q. (By Mr. Beehler): What were your findings in connection with test No. 5?

A. No. 5 was also torqued at 200-inch pounds, and there was no expansion in the region of the shoulder. Pardon me just a moment, please. No. 5 we are talking about?

Q. No. 5.

A. There was $2\frac{3}{4}/1000$ ths expansion in the mid-section of the sleeve head and there was $3\frac{1}{2}/1000$ ths expansion out at the end or the toe end of the sleeve.

Q. Now, may I just ask, Mr. Masters, in arriving at these figures which you have tabulated here, how much check was made on the micrometer readings?

A. You mean on the accuracy of the micrometer?

Q. On the accuracy of the micrometer. How many persons read it or how many times did you read it?

A. In most of these instances, there was at least one other person present who witnessed it and checked my figures.

Mr. Beehler: I offer for identification as Defendants' [620] Exhibit next in order Masters' test specimen No. 6.

The Clerk: Exhibit Z.

(Testimony of Irvin W. Masters.)

(The article referred to was marked Defendants' Exhibit Z for identification.)

Q. (By Mr. Beehler): Will you explain, Mr. Masters, your observation when specimen No. 6 was tested?

A. Well, we first torqued specimen No. 6 to 200-inch pounds. There was no expansion in the region of the shoulder, that is, the A zone. There was only 1/10th of a thousandth expansion in the mid-portion of the sleeve head, and there was 7/10ths of a thousandth expansion at the toe end of the sleeve.

We then torqued the same assembly to 350-inch pounds to see what would happen, and it expanded—I beg your pardon. I am crossing myself up here. This is not the one that we expanded to the excessive torque. That one we only tested to 200-inch pounds. I am sorry.

Q. Did you then after that test a specimen to a torque greater than the recommended inch pounds?

A. I did.

Q. What were your observations?

A. Mr. Beehler, if I may, because of the fact that I run across the wrong line here, I would like to correct the testimony as to the previous one. May I?

Q. Very well. [621]

A. Specimen 6 expanded under 200-inch pounds, there was no expansion at the shoulder. There was—maybe I did give you the right testimony. There was 1/10th of a thousandth expansion in the mid-

(Testimony of Irvin W. Masters.)

section of the sleeve head, and there was 8 ten-thousandths expansion at the toe.

Q. If I may suggest, I believe the line above is the correct one for No. 6. That is 7/10ths thousandths.

A. 7 ten-thousandths is correct. I am still crossed up.

Q. To repeat my last question, did you then test a specimen to which was applied a torque greater than that recommended, and, if so, describe it and give your observations?

A. We tested the same size assembly at 350-inch pounds, and the expansion at the shoulder 1/1000th of an inch; at the midsection, for some reason or another, it was only 1/10,000th of an inch; at the nose was 8/10,000th of an inch.

Then we increased the torque on that same specimen to 600-inch pounds, and the expansion at the shoulder was zero; the expansion in the midsection of the sleeve head was 4-4/10th thousandths; the expansion at the toe, or as nearly as we could measure it at the toe, was 6/1000ths.

Q. Then I find here, Mr. Masters, still another specimen, No. 7. Will you tell us what happened to that one?

A. This was a pushed on test. We used [622] 400-inch pounds and we got 4/1000ths of an inch expansion at the shoulder.

Q. Excuse me, Mr. Masters. For a dural sleeve, is that 400-inch pounds more or less than the recommended torque?

(Testimony of Irvin W. Masters.)

A. That is double the recommended torque.

Mr. Beehler: I offer now for identification Defendants' Exhibit next in order, Masters' specimen No. 10.

The Clerk: AA.

(The article referred to was marked Defendants' Exhibit AA for identification.)

Mr. Freeman: What about specimen 7? Are we going to skip that, or is that in?

Mr. Beehler: We do not have the physical test specimen No. 7 here.

The Clerk: This is offered as AA for identification.

Q. (By Mr. Beehler): Will you describe your observations in connection with test specimen No. 10, Mr. Masters?

A. Specimen No. 10 was a size 6 AN assembly with an aluminum-bronze sleeve, which we torqued to 112-inch pounds. There was no expansion in Zone A at the shoulder. There were 2-3/10 thousandths expansion in the midsection and 4-5/10 thousandths expansion near the nose of the sleeve.

Mr. Beehler: I offer now for identification Defendants' Exhibit next in order, Masters' specimen No. 11.

The Clerk: BB. [623]

(The article referred to was marked Defendants' Exhibit BB for identification.)

Q. (By Mr. Beehler): What were your observations in connection with specimen No. 11, Mr. Masters?

(Testimony of Irvin W. Masters.)

A. This was the same assembly as the last specimen, tested also at 112-inch pounds. There was no expansion at the shoulder. There was 1/1000ths expansion at the midsection of the sleeve head. There was 3-4/10 thousandths expansion at the nose end of the sleeve head.

Mr. Beehler: I offer now as Defendants' Exhibit next in order for identification Masters' specimen No. 12.

The Clerk: Exhibit CC.

(The article referred to was marked Defendants' Exhibit CC for identification.)

Q. (By Mr. Beehler): Will you state your observations in connection with the test of No. 12, Mr. Masters?

A. No. 12 likewise was a 6 size dural fitting with an aluminum bronze sleeve, which I torqued at 150-inch pounds. The expansion at the head was 5/10 thousandths; the expansion in the midsection of the head was 11½ thousandths; the expansion at the nose end of the head was 3-4/10 thousandths. [624]

Q. Now, Mr. Masters, these specimens which we have referred to up to this time were of whose manufacture? A. Well, I am not——

Mr. Freeman: He already answered that once, I think.

The Witness: I am not positive, but there are a mixture of parts there.

Mr. Beehler: May we pass the question, then?

I present now as Defendants' next in order, for identification, Masters' test specimen No. 35.

(Testimony of Irvin W. Masters.)

The Clerk: DD.

(The device referred to was marked Defendants' Exhibit DD, for identification.)

Q. (By Mr. Beehler): Will you give your observations in connection with that test?

A. This is an aluminum fitting assembly in the -8 size in which we have used the 811BT-8 dural nut, the 811FT dural body, with a dural sleeve made to the Parker 1935 drawing, which is No. 2-1835-2, in the -8 size. The tube flare was made with a 30-degree flaring pin, which is the specified 811 -8 size tool with the corresponding split die. This was torqued to 250-inch pounds. The expansion at the shoulder was zero; the expansion in the mid-section was 5/1000ths; and the expansion at the toe end of the sleeve was 6/1000ths.

Mr. Beehler: I offer now as Defendants' Exhibit next [625] in order, for identification, Masters' test specimen No. 36.

The Clerk: EE.

Q. (By Mr. Beehler): Will you describe your test and the results of that specimen, Mr. Masters?

A. This was the same sort of an assembly as specimen 35. The parts were made from the same drawings that I named in 35. This specimen also was torqued to 250-inch pounds. The expansion at the shoulder was zero; the expansion midway of the head of the sleeve was 4-4/10/1000ths; the expansion at the toe of the sleeve was 5-8/10/1000ths.

Mr. Beehler: I offer now as Defendants' Exhibit for identification next in order Masters' steel specimen No. 1.

(Testimony of Irvin W. Masters.)

The Clerk: FF.

(The devices referred to were marked Defendants' Exhibits EE and FF, for identification.)

Q. (By Mr. Beehler): Will you describe your test and the observations in connection with that specimen, Mr. Masters?

A. This is an assembly of flared tube, steel nut, steel sleeve, and steel body to the AN specifications, which we assembled, using the exploration holes for measurement. Under a torque of 500-inch pounds, which I understand is the torque used by one large airplane company, the Douglas Aircraft Company, in their installation specification, and the expansion at the shoulder was $6\frac{1}{2}/1000$ ths; the [626] expansion midsection was $15\frac{1}{2}/1000$ ths; the expansion at the nose was $17/1000$ ths.

Q. For the No. 8 size, in accordance with that test, would the expansion at the nose be enough, or not enough, to completely fill the inside diameter of the nut? A. Yes, it more than did so.

Q. Would the expansion at the large end of the sleeve be enough or not enough to fill the inside of the nut?

A. It would if the parts were at the basic dimensions.

Q. And if they were otherwise?

A. If the parts had more than the minimum tolerable clearance there could be a clearance.

(Testimony of Irvin W. Masters.)

Q. But with respect to the expansion at the toe end, even if the parts had their maximum clearance, would or would there not be a complete filling of the nut?

A. No, if there was a maximum clearance there still would be a little space there.

Q. About how many thousandths, do you figure?

A. Well, about $13\frac{3}{4}/1000$ ths of an inch on each side, or about $31\frac{1}{2}/1000$ ths of an inch on the diameter.

Mr. Beehler: I offer as Defendants' Exhibit next in order for identification Masters' steel specimen No. 2.

The Clerk: GG.

(The device referred to was marked Defendants' Exhibit GG, for identification.) [627]

Q. (By Mr. Beehler): What was your test and the results thereof in connection with that specimen, Mr. Masters?

A. This was the same assembly as the one just previously described, but torqued only to 250-inch pounds, which is the torque specified on the government sheets. The results were that there was no expansion at the heel—or at the shoulder, pardon me, at the shoulder of the sleeve; there was $11\frac{1}{2}/1000$ ths expansion in the midsection: there was $1/1000$ th expansion out at the toe.

Mr. Beehler: I note that it is noon.

The Court: Maybe this is as good a time to break as any. We will stand recessed until 2:00 o'clock this afternoon.

(Whereupon at 12:00 o'clock noon, a recess was taken until 2:00 o'clock p.m.) [628]

June 22, 1950—2:00 o'Clock P.M.

Mr. Beehler: Mr. Masters, will you resume the stand?

IRVIN W. MASTERS

the witness on the stand at the time of recess, having been heretofore duly sworn, resumed the stand and testified further as follows:

Direct Examination
(Continued)

By Mr. Beehler:

Q. Mr. Masters, have you prepared a little sketch showing the set-up that you used when you made these tests that we have described here this morning?

A. Yes. I have made a little sketch of the method in which we tested the sleeves out in the open, what we call the push-on test.

Mr. Beehler: I would like to present for Defendants' Exhibit next in order for identification the sketch prepared by Mr. Masters showing the set-up which he used for the purpose of the test.

The Clerk: HH.

(The document referred to was marked Defendants' Exhibit HH for identification.)

(Testimony of Irvin W. Masters.)

Q. (By Mr. Beehler): Will you state again briefly with relation to that sketch, Mr. Masters, just what the characters represent? [629]

A. Well, I have shown there some parts between two jaws of a vise. The parts are simply a holder that slid on the one jaw of the device and another holder which slid on the other jaw of the device. On one holder is a stem with a threaded portion, with the thread the same fit as on the 8 size AN body.

Onto this was screwed an AN nut into which we placed an AN819 sleeve, in which sleeve there was a short piece of flared tubing to specification AND10061.

Opposed to that in the other holder, in the other jaw of the vise, is an AN816 8 D fitting, D meaning dural.

They were then brought together just to the point of touching, being lined up. The nut then was screwed up finger tight, the vise jaws remaining fixed. Then we tightened the nut to drive the sleeve onto the other portion according to the specified wrench torques that we have mentioned in the tests.

There were just a few of these push-on tests. We felt that we would get more accurate results with the pull-on test using the aspiration holes in the nut, and there was a slight possibility of a misalignment here and not getting just the same results that we would get under the normal conditions.

Q. Will you compare the micrometers which you had available for measuring the expansion and tell

(Testimony of Irvin W. Masters.)

us why you used the needle point micrometer, rather than the other kind? [630]

A. Well, the ordinary micrometers for measuring cylindrical diameter have anvils of some breadth. We were measuring conditions in very narrow zones on these sleeve heads, so we used these needle point micrometers, which have anvils that come to a point, not to an exact point, but to a very small diameter, so that we could measure the condition of the narrow zones.

Mr. Beehler: I wish to offer in evidence at this time Defendants' Exhibits O through HH, inclusive.

The Court: They may be received.

(The exhibits referred to were received in evidence and marked Defendants' Exhibits O through HH.)

Q. (By Mr. Beehler): Referring once again, Mr. Masters, to the tabulation of your test results, and directing your attention to steel No. 1, Defendants' Exhibit FF, will you give us again your observations in connection with the resultant expansion, taking into consideration the maximum and minimum tolerances which would be allowable under those conditions, according to the AN specifications?

A. When wrenched to 500-inch pounds torque, the sleeve in this specimen expanded .0065 at the shoulder of the sleeve head; midway of the length of the sleeve head, it expanded .0155, and at the area measured right near the nose of the sleeve head, the expansion was .017.

(Testimony of Irvin W. Masters.)

The expansion at the shoulder would result in a light [631] contact or interference of .005 or one-half thousandth of an inch, if the clearance was at the minimum between the nut and the sleeve.

Likewise, if the clearance was at the minimum at the other two sections of the sleeve, the midsection and at the nose, there would be interference there.

Q. By interference, you mean that the sleeve would expand so as to contact the inside——

A. Of the nut?

Q. ——of the nut at those points?

A. That's right, and try to occupy some of the same space that the nut was occupying. That would mean that at the minimum clearance at the end of the sleeve, the sleeve would expand to 4-1/10 thousandths greater than the diameter of the nut.

Q. Then how would it compare under conditions of maximum clearance?

A. Under maximum clearance, there would be a diametrical clearance left of .0055 at the shoulder after the expansion, and at the nose there would be .0019 clearance left, or just under, .002 clearance at the nose. [632]

Q. Then, will you select an intermediate clearance and tell what the conditions would be then?

A. If the parts were just in the middle of the tolerance the clearance at the shoulder would be .0025, but there would be at the end, or nose end of the sleeve, the sleeve would expand .001 more than the diameter of the nut, there would be an interference.

(Testimony of Irvin W. Masters.)

Q. Tell us, then, Mr. Masters, what your observation was as a result of this series of tests with respect to the expansion of AN sleeve heads at the larger end, related, of course, to the surrounding wall of the nut?

A. I would state that under normal torquing conditions and moderately over-torqued, the sleeve at the large diameter or shoulder end of the sleeve head would not engage the nut.

Q. Under those circumstances would it make any difference whether the sleeve head missed the nut by 15/1000ths of an inch instead of the two or three thousandths of an inch, which you found as a result of tests?

A. No, there is no restraint or pressure set up until an actual contact has been made, and the one part moved to the point of embedding itself or trying to embed itself on the other part.

Q. You have observed, Mr. Masters, during the course of the plaintiff's presentation of its case, certain sectioned samples of made-up couplings have you not? [633]

A. Yes.

Q. Have you examined those sections to determine, if you could, what the clearance might be between the external surface of the sleeve head and the surrounding wall of the nut?

A. I have on several of them, yes.

Q. Were you able to determine accurately from your observation of those sections anything about the relationship of the expanded sleeve head and the inside of the nut?

(Testimony of Irvin W. Masters.)

A. Well, we found some open spaces which we could measure in the condition that they are in, but that didn't indicate to me anything as to their condition when they were assembled.

Q. What happens to the hoop tension in the sleeve when it is cut away and sectioned?

A. There isn't any hoop tension in the sleeve when it is cut apart.

Q. What would ordinarily happen to a hoop under tension under circumstances such as that?

A. It would fall off of whatever it was hooping.

Q. May I direct your attention now, Mr. Masters, to Figure 2 of the patent in issue, No. 2,212,183, which according to the patent specification represents the parts before they are tightened up, and may I direct your attention particularly to that portion of the sleeve head adjacent the [634] shoulder, and its relationship to the surrounding wall of the nut, and I ask you during your manufacture of sleeves and nuts has there come under your observation sleeves sufficiently large at the head so that they would bear that relationship to the nut?

A. Yes, I have seen a number of such sleeves that would be large enough in diameter to contact the nut.

Q. What relationship would those sleeves have to AN specifications?

A. They would be outside the tolerance of the AN specifications. They would be too large.

Q. Would they be acceptable on test?

A. No, not if they were inspected.

(Testimony of Irvin W. Masters.)

Q. Suppose you shipped sleeves of that character to your customers, what would happen to them?

A. They would probably come back. I say "probably," because they might slip through inspection. They couldn't use them.

Q. We talked this morning, Mr. Masters, about the NAF fitting. I neglected to ask you at that time how long ago it was that the NAF fitting, and the specifications of angles relating thereto, was established?

A. They were established early in 1935, adopted in part in the fall of '35, and up to the one-inch size in 1936.

Q. You are familiar, also, are you not, Mr. Masters, [635] with the inverted flare type fitting, so called SAE fitting? A. Yes.

Q. That is a two-piece fitting, is it not?

A. That's right.

Q. What companies manufacture that particular type fitting?

A. I believe they have been manufactured by a number of different companies. I know the Weatherhead Company has manufactured the inverted flare, SAE inverted flare, for many years.

Q. Do you know of any aircraft which use the inverted flare fitting, the two-piece fitting?

A. Well, the Air Corps 810 is an inverted flare fitting, which has been used very extensively and is still on some of the older ships.

(Testimony of Irvin W. Masters.)

Q. Did you ever hear of the Navion plane, manufactured by North American Aviation?

A. Yes.

Q. Do you know what kind of fittings are used on that plane?

A. They use the SAE inverted flare, brass fittings, on that. [636]

Q. Directing your attention now, Mr. Masters, to another colored sectional sketch, identified on its face as section No. 5, I ask you who made that sketch?

A. I made the sketch.

Q. What scale did you use for the making of that sketch?

A. That is 40 to 1.

Mr. Beehler: I request that be marked II for identification.

The Court: It may be so marked.

(The document referred to was marked Defendants' Exhibit II for identification.)

Q. (By Mr. Beehler): With respect to Defendants' Exhibit II, what was the source of the figures which you used in making that sketch?

A. Well, the nut, the blue part, is from AN drawing, Army-Navy drawing, AN818.

The red portion or sleeve is from AN819.

The yellow portion, the flared tube, is from AND10061.

Q. And that is for size 6, is it not?

A. That's right.

Q. What governed your selection of the precise dimensions employed in depicting the exterior of

(Testimony of Irvin W. Masters.)

the head of the sleeve and the interior of the surrounding surface of the nut? [637]

A. The sleeve dimensions are from AN819, and the nut dimensions are from AN818.

Q. Did you pick maximum or minimum tolerance conditions?

A. One moment, please. Those are the basic dimensions, which would mean—you asked for maximum and minimum tolerances. These are at the minimum clearance conditions.

Q. That is, you picked the dimensions which would give the minimum clearance possible for the parts when put together? A. That is correct.

Q. Then with respect to the sleeve head angle depicted in the sketch, what guided your selection of that particular angle?

A. That also is the minimum angle that is permitted.

Mr. Beehler: I now present for identification Defendants' Exhibit JJ, consisting of another colored sectional sketch.

The Clerk: JJ for identification.

(The document referred to was marked Defendants' Exhibit JJ for identification.)

Q. (By Mr. Beehler): I ask you who made that sketch? A. I made it.

Q. That was to a 40 to 1 scale?

A. That's right. [638]

Q. From what source did you get the information which you used in drawing the nut, the sleeve, and the flare of that sketch?

(Testimony of Irvin W. Masters.)

A. The section that is a portion of the nut, in blue, is from Parker drawing 2-1835-1, in the -6 size.

The red portion, which is the sleeve, is from Parker drawing 2-1835-2, in the -6 size.

Q. What was the year of issuance of those Parker drawings, if you know?

A. They are dated February 18, 1935.

Q. What guided you in selecting the particular outside dimensions of the sleeve head and the inside dimensions of the surrounding nut?

A. I think it was in this instance the minimum tolerable diameter of the sleeve head and the maximum tolerable diameter of the nut.

Q. And that gave you what with respect to the clearance?

A. The maximum tolerable clearance.

Q. Why does there not appear a sleeve head angle on the exterior of the sleeve of this sketch?

A. Because it didn't appear on the drawings that I used to make this reproduction.

Q. Which gives the greater clearance, Exhibit II or Exhibit JJ, the greater clearance between the sleeve head and [639] the nut?

A. The Exhibit JJ just described gives the greater clearance. There are two clearances involved in II.

Q. The clearance at the large end of the sleeve head?

A. The clearance at the large end of the sleeve head in II is .003. The clearance between the sleeve and the nut in JJ is .0045.

(Testimony of Irvin W. Masters.)

Q. It is greater than in the earlier sketch, the sketch depicting the earlier drawings?

A. That's right.

Q. Will you compare, then, the clearance at the toe end of the sleeve head of Exhibit II, which depicts AN assembly No. 6 or part thereof?

A. In the Exhibit II, which is the AN assembly No. 6, the clearance at the toe end of the sleeve is .00432 and in the Exhibit JJ the clearance at the toe end is .0045.

Q. The greater clearance, then, is in the 1935 drawing, is that correct? A. That is right.

Q. Will you refer now, Mr. Masters, to Plaintiff's Exhibit 28-J, which is captioned, "Advantages of Sleeve Head Angle Permits Free Expansion of Sleeve Head." Do you or do you not find it true that the clearance depicted in Exhibit JJ permits free expansion of the sleeve head? [640]

A. Yes, it does.

Q. Referring now to Plaintiff's Exhibit 28-K, captioned, "Advantages of Sleeve Head Angle, Expansion of Sleeve Head Provides Hoop Tension," do you find that to be true of the parts shown in Exhibit JJ? A. That is true.

Q. Referring to Plaintiff's Exhibit 28-L, captioned, "Advantages of Sleeve Head Angle, Hoop Tension Locks Nut Against Loosening," do you find or do you not find that the clearance shown in Exhibit JJ has that advantage?

A. Well, there is clearance there that would permit expansion, yes. [641]

(Testimony of Irvin W. Masters.)

Q. Refer, please, to Plaintiff's Exhibit 28-M, "Advantages of Sleeve Head Angle, Free Expansion Corrects Out-of-round Sleeves"; does or does not the clearance shown in Exhibit JJ permit free expansion to correct out-of-roundness of sleeves?

A. Well, it would if the sleeve in 28-M would permit it. There is greater room for expansion in Exhibit JJ. That would permit it.

Q. Refer now to Plaintiff's Exhibit 28-N, captioned, "Advantages of Sleeve Head Angle, Expansion Converts Toe Contact to Area Contact"; would the clearance of Exhibit JJ affect that?

A. Well, I don't see any toe contact there.

Q. Turn now to Plaintiff's Exhibit 28-O, "Advantages of Sleeve Head Angle, Expansion Makes Amount of Nut Turning Less Critical"; do you find the same advantage in the clearance provided in Exhibit JJ?

A. Yes, there is.

Q. Turn now to Plaintiff's Exhibit 28-P, captioned "Advantages of Sleeve Head Angle, Angle Provides More Room for Expansion Where Expansion is Greatest"; do you find or do you not find that the clearance on Exhibit JJ provides that same advantage?

A. Yes, there is room for expansion there just the same, a little more of it, in fact. [642]

Q. Turn to Plaintiff's Exhibit 28-Q, captioned "Advantages of Sleeve Head Angle, Angle Permits Maximum Shoulder Contact"; do you or do you not find that same advantage in the parts shown in Exhibit JJ?

A. In JJ the drawing was reproduced from

(Testimony of Irvin W. Masters.)

Parker's drawings in which there was no radius shown on the outside shoulder corner of the sleeve, nor no fillet in the nut. I am not able to make a comparison on that without some calculations. But I would say that JJ would have more area on the shoulder-to-shoulder contact than 28-Q.

Q. Refer now to Plaintiff's Exhibit 28-R, "Advantages of Sleeve Head Angle, Angle Facilitates Disassembly of Sleeve from Nut"; do you or do not find that same advantage in the relationship of parts shown in Exhibit JJ?

A. That's right. Just a matter of clearance.

Q. Refer to Plaintiff's Exhibit 28-S, "Advantages of Sleeve Head Angle, Angle Provides Additional Clearance to Avoid Locking of Sleeve to Nut"; do you or do you not find those same advantages present in the clearance provided in the showing of parts in Exhibit JJ?

A. If 28-S has clearance enough to prevent locking, Exhibit JJ would.

Q. Refer now to Plaintiff's Exhibit 28-T, "Advantages of Sleeve Head Angle, Angle Prevents Scoring of Flare"; will you compare the parts of Exhibit JJ with that and give [643] us your judgment?

A. In my judgment the matter of scoring is a matter of workmanship more than anything else. I never observed any scoring where the sleeve was integral with the nut. But if the angle in the sleeve 28-T results in a clearance that would be any bene-

(Testimony of Irvin W. Masters.)

fit in that respect, the clearance in JJ is sufficient to be a greater benefit.

Q. Will you compare Plaintiff's Exhibit 28-U with the relationship of parts shown in Exhibit JJ?

A. It says the "Angle prevents twisting of tube." I presume that that means that the angle permits the sleeve to expand under torque without seizing on the nut. And that, again, would be a matter of clearance, and you would have the same clearance on JJ, or greater clearance on JJ in the condition shown. So if in 28-U it prevents twisting of the tube, JJ would also.

Q. Refer now to Plaintiff's Exhibit 28-V, "Advantages of Sleeve Head Angle, Angle Facilitates Disassembly of Bent Tubes"; do you or do you not find the same advantage in the relationship shown in Exhibit JJ?

A. Yes, that is just a matter of clearance, again.

Q. Refer, finally, to Plaintiff's Exhibit 28-W, "Advantages of Sleeve Head Angle, Angle Facilitates Disassembly of Damaged and Tagged Tubes"; do you or do you not find the same advantages in the clearance relationship shown [644] in Exhibit JJ?

A. Yes, I do.

Q. Will you refer now, Mr. Masters, to Plaintiff's Exhibit 53. How does the relationship of parts of Plaintiff's Exhibit 53 compare with the relationship of parts of your drawing color section 2?

Mr. Huebner: That is Exhibit V.

Q. (By Mr. Beehler): Exhibit V.

Mr. Huebner: I am wrong on that.

(Testimony of Irvin W. Masters.)

Mr. Freeman: I suggest we have the chart marked or we will have a bunch of exhibits in the Court of Appeals that they won't know what they are.

The Court: The charts have already been marked, but counsel isn't calling them by the marks.

Mr. Beehler: They don't have the marks on them.

Mr. Freeman: May I ask whether these charts are going in evidence, or are you putting small ones in? These have never been marked, your Honor, as far as I know.

Mr. Beehler: The charts are going in evidence.

Mr. Freeman: Then I suggest that they be marked.

Mr. Beehler: May we take time out just to make the marks on the charts to compare with the marks on the small sketches which we submitted?

May we have the question read?

(The question referred to was read by the reporter [645] as follows:

“How does the relationship of parts of Plaintiff's Exhibit 53 compare with the relationship of parts of your drawing color section 22?”)

Q. (By Mr. Beehler): Defendants' Exhibit P.

A. As far as I can see, they are practically the same. However, the lines are relatively heavier, and the lines blend here——

Q. By “here” you mean——

A. In Plaintiff's Exhibit 53. So that I just

(Testimony of Irvin W. Masters.)

can't be sure of where the contacts are made, nor do I know that the angles are the same. They appear to be the same. [646]

Q. Will you refer now to Plaintiff's Exhibit 58 and the drawing shown there and compare it with Defendants' Exhibit O, and state for the record whether the relationship of parts is the same?

A. No. Plaintiff's Exhibit 58, the sleeve appears to extend out farther toward the large end of the sleeve—the sleeve appears to extend out farther on the large end of the flare than in our scale drawing.

Q. Do you note any other differences, or is that all?

A. I can't tell exactly, because there is nothing on this drawing to indicate sizes. It is illustrative. It seems to be otherwise in about the right proportions, but I don't know about the spaces there or the thickness of those lines.

Q. Will you compare the drawing in Plaintiff's Exhibit 59 with Defendants' Exhibit O?

A. The same observations as concerning Plaintiff's Exhibit 58, namely, that this sleeve 10 appears to contact the flared tube 2 out nearer the end than in our scale drawing.

Q. Which of the two drawings do you consider more accurately depicts the relationship of parts, taking into consideration their dimensions?

A. The scale drawing, I am sure, is more accurate.

(Testimony of Irvin W. Masters.)

Mr. Beehler: Will you mark this as Defendants' Exhibit [647] KK for identification?

(The document referred to was marked Defendants' Exhibit KK for identification.)

Q. (By Mr. Beehler): I refer you now, Mr. Masters, to another colored sectional drawing, which I have had marked Defendants' Exhibit KK for identification. Will you tell us who made that drawing? A. I made it.

Q. What scale is that drawing made to?

A. 20 to 1.

Q. What did you use as a source of information for making that drawing, Defendants' Exhibit KK for identification?

A. The blue portion is a section of the AC811-6 nut.

The red portion is a current AC811T -6 size sleeve in steel.

Q. There is a second portion defined by a black line only. What is the source of the dimensions used for that?

A. That is Parker drawing 2-1835-2 in the -6 size sleeve.

Q. What is the year of issue of the Parker drawing, if you know? A. 1935.

Q. Taking, for example, the No. 6 size which you have [648] used for the basis of the drawing, how do the angles compare at the inside of the flare, the portion of the flare of the sleeve head which contacts the flare of the tube?

(Testimony of Irvin W. Masters.)

A. They are identical, 25 degrees.

Q. What did you find to be the outside diameter of the large end of the sleeve head shown in red?

A. It is 502/1000ths.

Q. What did you find to be the outside diameter of the sleeve head outlined in black, which you say was taken from the 1935 Parker drawing?

A. 503/1000ths.

Q. What is the difference between the two in thousandths of an inch?

A. .001, one thousandth of an inch.

Q. What is the inside diameter of the surrounding wall of the nut in each case?

A. 508/1000ths.

Q. The clearance, then, between the nut and the sleeve head of the 1935 Parker drawing is how much?

A. .006.

Q. And the clearance between the sleeve head shown in red and the surrounding nut is how much?

The Witness: Pardon me, Mr. Beehler. Will you please repeat Mr. Beehler's question; not the last one, but the one before? [649]

(The question referred to was read by the reporter, as follows:

“Q. The clearance, then, between the nut and the sleeve head of the 1935 Parker drawing is how much?”)

Q. (By Mr. Beehler): I believe you will find that to be .005, if I am not mistaken.

A. I am kind of confused as to the actual dimen-

(Testimony of Irvin W. Masters.)

sions here. Let me look at this larger drawing and maybe I can see faster. The clearance between the sleeve head and the nut, using the 35 part, is [640] .005.

Q. And the clearance between the nut and the AC-811 sleeve is, then—— A. 6/1000ths.

Q. So that there is only 1/1000th less clearance in the Parker sleeve as made in 1935?

A. That's right.

Q. The dimensions of the nut there shown were the same, were they, or not, as nuts made in accordance with the 1935 drawings?

A. That's correct.

Q. Have you any reason to believe, Mr. Masters, that nuts and sleeves were not actually made in accordance with those drawings?

A. Well, Mr. Wolfram so stated, that the sleeves were not.

Mr. Freeman: I suggest this witness answer as to what he knows, not what he heard here in the court room. After all, we are examining this witness with respect to the facts.

The Court: I think that is proper. The witness should not testify as to what he has heard here in court. The question is does he know.

Q. (By Mr. Beehler): Do you know, Mr. Masters, whether or not sleeves and nuts were made in accordance with the dimensions which you show on Defendants' Exhibit KK?

A. I had understood that they were. [651]

Mr. Freeman: The same objection.

(Testimony of Irvin W. Masters.)

A. (Continuing): And my basis for that, if I may proceed, is that the changes recommended by the Parker Appliance Company in a five-page letter from Mr. Parker, it was in the Amon deposition, carried recommended changes in the dimensions of the fittings, which carried me back to these 1935 figures. Frankly, I don't have them clear enough in mind to testify, but previous to the statement that I referred to I had believed these drawings represented the parts as made from 1935 to '38 or '39, some time thereafter.

Q. (By Mr. Beehler): Where did you get the 1935 drawings?

A. They were given to us by the Parker Appliance Company as drawings of parts commercially produced by them.

Q. You testified, Mr. Masters, at some length comparing Parker's Exhibits——

The Court: Before you get into that, we will take our afternoon recess. It is 3:00 o'clock. We will now recess until 15 minutes after three.

(A recess was taken.)

Q. (By Mr. Beehler): Mr. Masters, in connection with Plaintiff's Exhibit 28-J through 28-W, inclusive, you made certain comparisons as to the advantages of Defendants' Exhibit JJ. Could you or could you not make those same comparisons between the structure depicted by the black [652] outline of the sleeve in Defendants' Exhibit KK, depicting the Parker 1935 sleeve, and the same plaintiff's exhibits?

(Testimony of Irvin W. Masters.)

A. Yes, the comparison would be the same.

Mr. Beehler: I believe I failed to offer Defendants' Exhibit KK into evidence, which I shall now so do.

The Court: It may be received.

(The document, heretofore marked Defendants' Exhibit KK for identification, was received in evidence.)

Mr. Beehler: I also offer Defendants' Exhibit II and JJ.

The Court: They may be received.

(The documents, heretofore marked Defendants' Exhibits II and JJ, for identification, were received in evidence.)

Mr. Beehler: In order to clarify the record at this point, may I suggest that it is the large charts which we are offering in evidence as Exhibits, and that the same photographic reproductions which we have variously been referring to here were for convenience.

Q. (By Mr. Beehler): Once again, Mr. Masters, with regard to Defendants' Exhibit KK, how does the present-day AN standard nut compare with the nut which you showed on that drawing, having reference specifically to the inside dimension of the portion which surrounds the sleeve?

A. In the 6 size 818 nut the bore is 508, and the bore [653] is 508 on this nut shown in this drawing KK, the same dimension.

(Testimony of Irvin W. Masters.)

Q. Mr. Masters, are you familiar at all with the inspection practices of the airplane companies where it relates to the inspection of three-piece fittings of the kind here concerned?

A. Do you mean on the receiving inspection, receiving of the parts?

Q. Receiving of parts delivered from the fitting manufacturer.

A. Yes, I am.

Q. Which ones are you more familiar with?

A. Well, we ship parts to all of the airplane companies; a few parts to some, many to others. I presume I am most familiar with Lockheed, because we are close by and ship them quite a lot.

Q. What is the inspection practice of Lockheed, if you know, with respect to the inspection of the sleeves for a sleeve head angle?

A. I don't know what their inspection purposes are all the time, but I was told in one instance——

Mr. Freeman: I object to that. It is strictly calling for hearsay.

The Court: I think the objection is good. That is what he was told. [654]

Q. (By Mr. Beehler): Have you shipped any sleeves to the Lockheed Aircraft Company on which there was no sleeve head angle?

A. I have.

Q. How many thousand sleeves have you shipped that way?

A. There were 6,000 in one lot.

Q. Did they pass inspection?

A. They did.

Q. Did they know there was no sleeve head angle there?

Mr. Freeman: That is objected to. If he wants

(Testimony of Irvin W. Masters.)

to testify as to what he told them, that is one thing; as to whether they knew, or not, that is asking for a state of mind of somebody that he is not in position to testify to.

The Court: I think the objection is good.

Mr. Beehler: All right. [655]

Q. (By Mr. Beehler): Are you familiar at all with the practice and recommendations of the Society of Automotive Engineers with respect to three-piece fittings of the kind we are referring to here?

A. I know what they have adopted to go into the standards book for 1950. I have a pre-print of that.

Q. What have they adopted with regard to the sleeve head angle for the 1950 book?

A. They have made that optional.

Q. I call your attention, Mr. Masters, to Plaintiff's Exhibit 14, which is a letter to you from the Parker Appliance Company, dated August 12, 1943, which was presented in evidence in support of the contention that you were given a license under the Parker patents, and I call your attention to the drawings listed in that particular letter. Have you looked up those drawings? A. I have.

Q. Do you have them here?

A. These are the drawings.

Q. The numbers on the drawings in your hand correspond to the numbers in the letter?

A. Yes, they do.

Q. What are shown in these drawings?

(Testimony of Irvin W. Masters.)

A. Well, drawing A9-2941-9 is a bulkhead flange with an internal pipe thread on one end and an 811 nose detail or [656] body detail on the other end.

Drawing A1-2537-15 is simply a plate that is used for riveting. It is just like a washer.

Drawing A4-2342-2 is another bulkhead flange with an internal pipe thread on one end and a triple body detail on the other end.

The drawing A12-2741-27 is a bulkhead flange with internal pipe threads on both ends.

Q. Were these drawings that were given to you in connection with that letter? A. They were.

Mr. Beehler: I offer in evidence Defendants' Exhibit LL, drawing No. 9-2941-9; Defendants' Exhibit MM, drawing No. 1-2537-15; Defendants' Exhibit NN, drawing No. 4-2342-2; Defendants' Exhibit OO, drawing No. 12-2741-27.

The Court: They may be received.

(The documents referred to were received in evidence and marked Defendants' Exhibits MM, NN, and OO.)

Q. (By Mr. Beehler): From the drawings you have just been shown, Mr. Masters, could you make up a fitting assembly, a three-piece fitting assembly?

A. No.

Mr. Beehler: You may have the witness, Mr. Freeman.

The Court: May I ask the witness a question before you take the witness? [657]

Mr. Freeman: Yes, sir.

(Testimony of Irvin W. Masters.)

The Court: Mr. Masters, there has been a contention by your counsel on several occasions that the fittings that you made were not the fittings as described in the patent.

The Witness: That's right.

The Court: Do you contend that the fittings you made are not the fittings described in the patent?

The Witness: That's right.

The Court: Could I have the exhibits starting with the drawings, the blueprints, the photostatic copies?

I notice in all these drawings that have been introduced, O, P, Q, R, that only drawing P shows there is a toe contact. Did you make any sleeves in which there was a toe contact?

The Witness: I made sleeves from this drawing, your Honor, but I hardly regard that as toe [658] contact.

The Court: Well, that is the only drawing we have here in which it shows that the toe came in contact with the flare, and I say it is toe contact. It may not be toe contact, I don't know. But this is the only drawing which shows that. So I am wondering whether any of the fittings you made were made for toe contact.

The Witness. If this is toe contact, well, we made such fittings. But what is a toe? The end?

The Court: Assuming that this is a toe contact fitting——

The Witness I have made these.

(Testimony of Irvin W. Masters.)

The Court: You made some of these?

The Witness: Yes.

The Court: Were these the fittings which you made mostly, or did you make the fittings in which the toe did not come in contact with the flare of the sleeve?

The Witness: Well, we have made all along relatively few sleeves, your Honor. Most of our fittings have been bodies, because we are particularly proficient in the manufacturing of bodies. Sleeves and nuts are made by automatic screw machine manufacturers, and we have made relatively few of those. I would say that of the sleeves which we have manufactured, that from the standpoint of number of sleeves, we perhaps have made as many of these size 6 and under sleeves as we have made over size 6. Over size 6 the sleeve is not what you call toe contact, but the sleeve is as in Exhibit O, [659] or in the case of the 811 fitting, as in Exhibit Q. That is in all sizes over 6. From the standpoint of value, I would say that we have made a much less number of sleeves, dollar value, under this size than we have made over.

The Court: If it became necessary you could tell us the number of sleeves that you actually made?

The Witness: Yes, we have complete records from our whole history.

The Court: One other question. According to the testimony that has been introduced so far, your original plans were furnished either by the Parker Company or by the airplane companies, that is when

(Testimony of Irvin W. Masters.)

you originally started to make fittings or parts of fittings, is that correct?

The Witness: No, it isn't correct. We made millions of fittings that we received no plans from the airplane companies or Parker. In the 811 fittings, we had to synthetize the dimensions from the information that we could extract from the Air Corps and the Navy. And not until along in '43, to my knowledge, did drawings become available from the Parker Appliance Company, generally. We had in this district, in the Western Procurement District, a Col.^o Owens, I believe, was his name, and he got on the warpath in late '43 because of the fact that his inspectors were obliged to inspect millions of fittings without any drawings to inspect to, without any official drawings. Not that there [660] was anything wrong with them, but he wanted some official drawings. And about that time the aircraft scheduling unit and the industry's committee, fitting industry's committee, had a huddle as to how to get official drawings. We were making, then, several hundred different items for which we didn't have Parker Company drawings, and there were no official Air Corps drawings. But everybody knew what the details were of the Parker fitting, that is, the 811 series, that we knew as the Parker fitting, and of course the AN details were a matter of publication of the government officials. However, we ran into difficulty when some fittings were made, not as to the detail of the nose and nut and sleeve being the wrong sizes, but the overall size of the

(Testimony of Irvin W. Masters.)

fittings sometimes was wrong from the standpoint of the airplane company who formerly, we will say, had bought fittings made by the Parker Company. Then when they would get fittings from us, or somebody else, by the same name, although the nuts and sleeves would go on, they would be too short, they wouldn't fit the same lengths of pipe and fit into the same place. So then it became necessary for us all to have our drawings coordinated, and the best place to coordinate them was, of course, to get them from Parker who was the father of this child, and they did supply the industry with drawings. But previous to that we had filched the information one way or another before, so we didn't need many from them. [661]

The Court: When you make a sleeve, do you have a die from which the sleeves are made, or are they made automatically?

The Witness: The sleeves are usually made on automatic screw machines, and they are cut from a solid bar.

The Court. Do you have a die which you used?

The Witness: In the sleeves they don't use dies; they have turning tools, tools that bore and turn and form.

The Court: Is that automatic?

The Witness: That is automatic.

The Court: Did you set up this automatic procedure of turning out sleeves before you got the Parker plans, or after?

The Witness: The procedure of turning out—

(Testimony of Irvin W. Masters.)

did I set up the procedure of turning out sleeves?

The Court: Yes. You say it is made on a screw machine. I don't assume that it takes a manual operator to operate the machine?

The Witness: We were making sleeves long before we received any drawings from Parker, and these drawings received from Parker did not have any sleeves in them.

The Court: They didn't?

The Witness: No.

The Court: You didn't get any information about making the sleeve from the Parker drawings?

The Witness: On the 811 the sleeves, the information we [662] got undoubtedly originated with Parker, but the information we got was from the Air Corps, I am quite sure. [663]

The Court: Well, the thing we are concerned with here more than anything else, I think, is the sleeve, the shape of the sleeve, and the sleeve is made by an automatic machine, isn't that correct?

The Witness: That is correct, but the tools have to be manually shaped before the automatic machine can go to work.

The Court: Where did you get the information by which you could shape the tools?

The Witness: From the 811T drawings, which were available from 1935 on, and the modifications that were subsequently made were available.

The Court: Tell me this, the date of the patent——

(Testimony of Irvin W. Masters.)

The Witness: I believe I am a little in error on that, your Honor. The general 811 drawings were available from 1935 on, but it was stated they would be interchangeable with Parker. The detail drawings were available, I believe, from 1941 on.

The Court: The date of the Parker patent 2,212,183 shows it was originally filed March 2, 1938.

The Witness: That's right.

The Court: You were making sleeves before March 2, 1938?

The Witness: No, I was not.

The Court: You were not? [664]

The Witness: I didn't start manufacture of these things until the middle of 1940 in the first instance, and I don't believe I made any sleeves until perhaps the fall of 1941.

The Court: When you started to make the sleeves, did you use the Parker drawings, regardless of whether you got them direct from Parker, or did you get them from an airplane company?

The Witness: No. I used the Air Corps drawings, I am quite confident.

The Court: Was that a Parker drawing?

The Witness: It originated with Parker, so far as the sleeve is concerned, except that the dimensions were modified to come in line with the general dimensions of the AN parts.

The Court: That's all. Excuse me for breaking in.

(Testimony of Irvin W. Masters.)

Cross-Examination

By Mr. Freeman:

Q. Mr. Masters, when you made these charts and put your measurements thereon, did you measure from the inside of the black line or the outside of the black line, or the middle of the black line?

A. I intended, as far as it is practicable, to have dimensions of the nut, for instance, on the outside of the line. Considering the colored section as being inside the line, [665] the white section, the edge of the white section, was the dimension.

Q. Well, taking Defendants' Exhibit Q, for example, did the overall dimensions go to the outside of the black line or to the inside of the black line or to the middle of the black line?

A. Now, when you speak of the overall dimensions, I would go to the outside of the line, considering the colored portion to be regarded as inside the line.

Q. But when you took a dimension following the drawings which you said you followed, you then measured distances between the outside of the two lines, that is, the two lines that form the thickness of the material, say, of the nut, at the point that I am indicating to you on the drawing?

A. I did.

Q. So that it wouldn't make any difference, so far as the overall measurement was concerned, whether the black pencil line was thick or thin, would it?

(Testimony of Irvin W. Masters.)

A. It would make a difference of two lines blended together.

Q. You just answer my question. I am asking you whether it would make any difference whether we used a thick line in outline of the nut section or a thin line.

A. Not if you truly knew which side of the line you [666] were using for reference.

Q. Up until I asked you the question, it was impossible to know which line you used?

A. That is right.

Q. I am correct, am I not?

A. You are correct.

Q. Now, you referred to some Parker 1935 drawings; correct? A. Yes, I did.

Q. Did you ever make up any fittings corresponding to those drawings? A. Yes.

Q. Do you have any such fittings available?

A. Yes.

Q. Will you produce them?

A. That is 35 and 36, our part 35 and 36. What was the exhibit number?

Mr. Beehler: Defendants' Exhibits DD and EE.

Q. (By Mr. Freeman): And I take it you employed a sleeve with the diameter of the head of the sleeve and the diameter adjacent the nose or toe end of the sleeve to be the same?

A. That's right, cylindrical.

Q. Now, will you tell me when you first began the manufacture as an individual of sleeves having greater diameter [667] at the region of contact

(Testimony of Irvin W. Masters.)

than at the nose or toe end of the sleeve?

A. I don't know the exact date. I presume that—if I may use that word, that we manufactured sleeves with a tapered head from the date that they became a standard with the Air Corps.

Q. You know as a fact, do you not, that that was developed by Parker?

A. I have no other knowledge. I think it was.

Q. You know as a fact, do you not, that the Parker Appliance Company furnished the Air Corps with drawings showing the angle on the sleeve, or the tapered sleeve, using your own words?

A. I don't have first-hand knowledge, but I had always thought you did.

Q. Now, the drawing that you have here produced, Defendants' Exhibit JJ that you made up, it does not have any tapered sleeve head; correct?

A. That is right.

Q. And the device that you make today in response to the—or in compliance with the AN specifications, does include a tapered sleeve head; correct?

A. As a general thing, yes.

Q. I want to know just what you mean by your answer, "as a general thing." [668]

A. Well, Mr. Freeman, except when we make a mistake, you put a taper on there. We did make a mistake and leave it off.

Q. You say you did make a mistake and leave it off?

A. Yes.

Q. Were they inspected?

A. They were.

Q. Were they returned?

(Testimony of Irvin W. Masters.)

A. No, they were not returned.

Q. Are you telling me now that they were used, notwithstanding the fact that they did not comply with specifications?

A. I presume they were or I would have received them back. It was only a recent transaction.

Q. You mentioned earlier that you sent some aircraft company some 6,000 sleeves without the taper.

A. That is correct.

Q. And were they used as NA fittings?

A. AN fittings, you mean?

Q. Yes, sir, AN fittings.

A. They were AN fittings that I delivered.

Q. Well, with or without the sleeve angle?

A. Without the sleeve angle.

Q. Were you requested by the purchaser to furnish AN sleeves? [669]

A. That is right.

Q. And do you call a sleeve that has no sleeve angle on it an AN sleeve?

A. In all other details, it would be an AN sleeve. It would not be complete, of course, without it.

Q. I wish you would answer my question. Do you call a sleeve head without the sleeve head angle on it an AN sleeve?

A. It is not a complete AN sleeve, no.

Q. What was the name of that customer?

A. The Lockheed Aircraft Company.

Q. Is that the basis for your counsel's statement that Constellations were flying wherein the sleeve head angle was not used on the fitting?

A. I had no knowledge that he made that state-

(Testimony of Irvin W. Masters.)

ment. If he did, it didn't refer to this, I don't believe. I don't know.

Q. Well, do you know then from your own contacts with Lockheed whether or not they do use fittings on their Constellations which do not incorporate the sleeve head angle?

A. I don't have knowledge that they intentionally do so, no. If I may a little more fully respond to get at what you want——

Q. Mr. Masters, you just go ahead and tell us all you want to tell us. [670]

A. Well, simply this, that on the Constellations they use the 811-T sleeve and the current design has a sleeve head angle on it. AN has a sleeve head angle. [671]

Q. So that when we talk about the 811 current design, that, then, does incorporate in the sleeve the same sleeve that we have here referred to as the AN sleeve; correct?

A. Yes; it is not the same angle on the 811 by a degree and a half.

Q. But it does include an angle?

A. Yes.

Q. And the region of the contact of the sleeve head is larger in diameter than the other end of the sleeve or nose end?

A. I am sorry, I didn't quite get that question.

Q. Maybe I can reframe it and shorten it. You go along with me that on the 811 the sleeve that is now currently used includes a taper or angle on the outside surface?

A. That's right.

Q. So that in the 811 as now used it is your tes-

(Testimony of Irvin W. Masters.)

timony that the sleeve head adjacent the region of contact between the sleeve head and the nut is in closer relationship to the wall of the sleeve than at the toe end or nose end of the sleeve; correct?

A. I can't answer the question as you have asked it. I can state that the diameter at the nose end of the 811 sleeve is smaller than at the shoulder.

Q. So that that wall—and by “that wall” I am referring to the wall of the sleeve itself—it is at a taper [672] or angle?

A. That's right.

Q. And the wall of the nut with which that particular sleeve is used is vertical or straight up and down, assuming that the parts are held in a vertical position? A. That's right.

Q. So that there is a greater distance between the lower end of the sleeve and the inside wall of the nut at the toe, then at the region of contact?

A. That's right.

Q. Do you know when the 811 sleeve was changed to include the angle or taper?

A. My recollection is that it was 1941.

Q. In other words, that was after the issue date of the Parker patent in suit?

A. It was issued in '40, wasn't it?

Q. Yes. A. Yes.

Q. Now, do you have in any of these drawings that you have here produced any illustration showing a taper on the sleeve earlier than 1938?

A. No, I have not.

(Testimony of Irvin W. Masters.)

Q. And I use the date 1938, and I am now going to ask you if you have any drawing or drawings that you have introduced in evidence showing an angle on a sleeve prior to March [673] 2, 1938, the filing date of the patent in suit?

A. I have none.

Q. I think you made some comparisons between Plaintiff's Exhibit 28, drawings, and Defendants' Exhibit JJ; that is correct, is it not?

A. That is correct.

Q. I think you said that there was just as much clearance or room for expansion in Defendants' Exhibit JJ as in the Parker patent in suit, or the drawings Plaintiff's Exhibit 28?

A. I said that, yes, that's right.

Q. Now, do you find in Defendants' Exhibit JJ any indication that would bring about limitation of expansion of the upper portion of the sleeve within the region of contact? A. No.

Q. And, as a matter of fact, there is just as much room for expansion in your Defendants' Exhibit JJ at the upper end as at the lower end of the sleeve; correct? A. Correct.

Q. Have you had any experience with devices like Defendants' Exhibit JJ—and I am now referring to physical devices? A. Yes.

Q. And when did you have that [674] experience? A. Within the last week or two.

Q. That is, whatever experience you had, then, was primarily in connection with your preparation

(Testimony of Irvin W. Masters.)

for testifying in this case?

A. That's right.

Q. You didn't have any experience when you were with the Bureau of Aeronautics in, I think, 1935, or so?

A. We conducted a good many tests on fittings, caused them to be conducted, but I don't have an independent recollection of this matter of the clearances in those fittings.

Q. You were in business with a Mr. Jackson in Dayton, Ohio, after you left the bureau, and before you came out West here to enter into the fitting business?

A. Not a Mr. Jackson.

Q. You were in business in Dayton, Ohio, in a sort of semi-consulting capacity?

A. That's right.

Q. Will you tell us about that? It was not included in your preliminary remarks as to your activities prior to entering into your present business?

A. All right. Following my work at the Bureau of Aeronautics, Navy Department, Mr. Thompson, who was the engineer at the Naval Aircraft Factory, who actually did the designing work on the fittings, and I, entered into consulting engineering business, Mr. Thompson really was my [675] employee, primarily for the purpose of assisting the Navy in the indoctrination of the services on the NAF fitting. The Weatherhead Company of Cleveland had undertaken to manufacture these fittings for the aircraft industry, and I represented the Weatherhead Company, also, in their relationship

(Testimony of Irvin W. Masters.)

with the government agencies. Our work was sales and engineering and showing the services how they could substitute the NAF fitting for the other fittings which had previously been used, namely, the 800 series, the 810 fittings, and what was then called the Parker triple fitting.

Q. In other words, the NAF fitting was, in fact, a two-piece fitting of Navy design?

A. That's right.

Q. And that is substantially as illustrated by Plaintiff's Exhibit 20 in section?

A. Yes, this, I believe, is an AN body with an 817 sleeve. It is a Chinese copy—it is an identical copy of the NAF.

Q. What I am getting at, Mr. Masters——

A. That's the type.

Q. ——is that it is illustrative of what has here been referred to as an NAF fitting, two-piece type.

A. That's right.

Q. And in the two-piece type that we have here, the [676] nut actually rotates on the flare itself?

A. That's right.

The Court: Mr. Freeman, I think possibly this is a good time to stop this afternoon. It is now 4:00 o'clock. We will recess until 10:00 o'clock in the morning.

(Whereupon, at 4:00 o'clock p.m. an adjournment was taken until 10:00 o'clock a.m., Friday, June 23, 1950.) [677]

June 23, 1950—10:00 A.M.

The Clerk: Further trial, Parker Appliance vs. Masters and Collins.

IRVIN W. MASTERS

the witness on the stand at the time of adjournment, having been first duly sworn, was examined and testified further as follows:

Cross-Examination
(Resumed)

By Mr. Freeman:

Q. Mr. Masters, you were asked on direct examination about the clearances, the angles, the torque, and the threads for the AN fitting, and as to where they originated.

No question was asked you on direct examination with respect to the sleeve angle. Can you tell me where that was originated, so we have the complete story?

A. I believe that originated with Parker Appliance Company.

Q. You testified with respect to non-proprietary fittings. What do you mean by "non-proprietary"?

A. Well, fittings that are in the public domain, public property.

Q. You mean non-patented?

A. That is right.

The Court: He means also, not only non-pat-

(Testimony of Irvin W. Masters.)

ented, but [679] where the patent expired, too. Isn't that true?

Mr. Freeman: That is the equivalent of non-patented, your Honor. That is within the public domain.

The Court: All right.

Q. (By Mr. Freeman): You testified with respect to dollar sales of bodies, sleeves, and nuts, and by that I mean you gave us percentage of one with respect to the other. It is true, is it not, that the sleeves sell at materially less than the bodies?

A. Yes.

Q. So that if we were to translate nuts and bodies into units, and then determine percentages, it wouldn't be 98, 1, and 1, would it?

A. Not in units, no.

Q. Can you give me some idea then of units percentage-wise?

A. It would be a very rough estimate. Are you seeking information as to our current sales or for what period, Mr. Freeman?

Q. Well, I am going to let you determine the period by the same period that you checked when you gave us the dollar sales of 98, 1, and 1. Whatever period you gave us in dollars, you give us the same thing now in units.

A. Well, I think that when I said 98, I was thinking of our experience since the war, say since the beginning of [680] 1946. Since that time I expect that our sales of units—this is purely an estimate, because I haven't made a count on it—would

(Testimony of Irvin W. Masters.)

be in the neighborhood of 8 or 10 per cent of the total pieces that we have sold.

Q. Do you ever receive any orders for sleeves, nuts, and bodies on the same purchase requisition?

A. I believe we have, yes.

Q. And do you sell fittings to such companies as United Air Lines?

A. I sell fittings to the air lines. I don't recall any sales to the United Air Lines.

Q. Well, you do sell to air lines as distinguished from airframe manufacturers?

A. That's right.

Q. And when you sell fittings to airlines, like the Northwest, United, TWA, those are used for repair and replacement parts; correct? For service work?

A. That is my understanding.

Q. And have you at times made sales of complete fittings, that is, a nut, body, and sleeve, of a particular size to make a complete fitting to any such companies?

A. I don't recall.

Q. You haven't checked your records?

A. No, I haven't.

Q. And I take it when you say you don't recall, you [681] are just not acquainted with the fact at the present moment?

A. That is true, that particular fact, no.

Q. Now, yesterday you produced a chart and said you made the drawing from the Air Corps sheets. Do you recall such a statement?

A. Yes.

(Testimony of Irvin W. Masters.)

Q. And that had to do with your Exhibit Q, if I am correct? A. Yes. I have that.

Q. Do you have any of the Air Corps drawings from which you made the chart, Defendants' Exhibit Q? A. Yes, I do. [682]

Q. You were asked, and I want to call your attention to the record on page 598:

“Where did you get the information which you used in making that drawing?”

And “that drawing” there referred to Defendants' Exhibit Q.

And your question was:

“The blue section is the nut. That was made from the current Air Corps 811 BT drawing.”

And then you further answered:

“The red section is the sleeve. That was made from the current Air Corps 811 T drawing of the sleeve.”

And you further answered:

“The green section, which represents the fitting end, was made from the Air Corps 811 fitting drawing. These are to a -8 size.”

So you referred to three Air Corps drawings as current Air Corps drawings; correct?

A. That's right.

Q. Do you have those three drawings that you refer to? A. Yes, I do.

Q. I am going to ask you if the Air Corps ever

(Testimony of Irvin W. Masters.)

put out a drawing marked Air Corps 811 or 811 BT, or 811 T. I am talking now about a government drawing, the Air Corps.

A. Well, the drawings that I referred to are marked [683] AC-811 BT, T, and HT. But I note that they do have the name Parker Appliance at the top. They were approved by the Air Corps. As you know, Mr. Amon, after the industry meeting in which your company was requested to supply these details, forwarded these to me and recommended that we get these approved by the Air Corps. These drawings that I referred to show the details on the particular parts, but they refer to the AC or Air Corps 811 which was issued by the Air Corps, and on that AC-811 sheet it shows several different shapes. As a matter of fact, all the standard shapes, not the odd shapes. So we regarded these as Air Corps drawings, even though they were under the Parker name.

Q. Now, you referred to some Air Corps drawings. Did those Air Corps drawings have any manufacturing dimensions on them, or were they manufacturing drawings?

A. No, that was the agony in the thing.

Q. So in order to manufacture fittings, which you have referred to as the 811 type, it required drawings from the Parker Appliance Company; correct?

A. Except that I did have information which was given by the Parker Appliance Company to the Navy during the standardization program for stand-

(Testimony of Irvin W. Masters.)

ardization. I understand—it is my information that Parker subsequently reneged on that agreement. Nevertheless we still had the information. We didn't need this to manufacture. [684]

Q. I am just going to ask you where did you get that information, or do you have any documents to support your statement about this reneging?

A. I don't have them here. They are in the files of the Navy. It is a statement of fact.

Q. Did you read those statements?

A. Yes.

Q. And are you now testifying from memory?

A. Very clear memory.

Q. It is very clear? A. Yes.

Q. And I am going to ask you about that in just a moment. Now, so that the record is straight, when you said "Air Corps drawings," you were, in fact, in answer to your counsel's question on page 598, referring to Defendants' Exhibits I, J and K, which bear the notation "The Parker Appliance Company, Cleveland, Ohio, U.S.A." thereon; correct?

A. I don't know those by exhibit numbers.

Q. I will show them to you.

A. Those are the drawings I was talking about, yes.

Q. You produced those drawings yesterday, and do you recall that we requested a complete set of drawings some time ago from you?

A. Do you mean the drawings that we regarded as inactive? [685]

(Testimony of Irvin W. Masters.)

Q. Active as well as inactive.

A. Yes, I do.

Q. And in addition to the three drawings which are here in evidence as Defendants' Exhibits I, J and K, you also had other drawings which bear the notation 811 ET? A. Yes.

Q. You did not produce that drawing?

A. No; we have all of them, though.

Q. And that drawing that I just referred to by designation ET is likewise a Parker Appliance drawing?

A. It has the name Parker Appliance on the top.

Q. As a matter of fact, when you received the drawings, those drawings were forwarded to you by the Parker Appliance Company, you didn't get them from the Air Corps?

A. Not that particular set, no. [686]

Q. Well, did you ever get from the Air Corps a set of drawings for the 811 type that did not have the Parker Appliance Company's name thereon—and I am now talking about manufacturing drawings.

A. No, I don't believe that we did, except possibly on specific orders for specific parts.

Q. Now, the drawings that were sent to you, some of which you have here produced as Defendants' Exhibits I, J, and K, were addressed to you personally; correct?

A. I don't know about that. I do believe that some of them were, but which, I don't know.

The Court: What difference does it make? I

(Testimony of Irvin W. Masters.)

think it has been understood, hasn't it, that it doesn't make any difference whether he got them as a person or as a corporation.

Mr. Freeman: It just makes this difference. If there is any question of license and the drawings were sent to him and he turned them over to the corporation, that was an unauthorized procedure. I heard him say here yesterday, with respect to this contention about a license, and it was their counsel or defendants' counsel who called attention to a certain letter, and then Mr. Masters said, "From the drawings forwarded to me with that letter, I could not make an 811 fitting." For some reason, they did not include the rest of the things. I am merely bringing that out.

The Court: My understanding is there is to be no issue [687] made as to whether or not this license was granted to the individual or corporation. I raised that question at the beginning of the trial.

Mr. Huebner: Well, on that, your Honor, our position has been that the individual merged into and became the corporation.

The Court: That's right, and if any liability is attached to the individual, it is also attached to the corporation.

Mr. Huebner: I think that is what we would have to agree to.

The Court: So what difference does it make whether these drawings were sent to him as an individual or a corporation?

Mr. Freeman: It makes this difference, your

(Testimony of Irvin W. Masters.)

Honor. We take the position that the corporation had no license whatever. A license is non-assignable. It is a personal piece of property and it cannot be assigned without the consent of the licensor.

The Court: You have got into the record the letter that was written to Mr. Masters as an individual, and if there is a license, the license depends upon that letter and not upon the plans.

Mr. Freeman: The plans define what the subject matter of the license was. If your honor will recall, yesterday—— [688]

The Court: As far as I am concerned, Mr. Freeman, it doesn't make any difference to me personally whether the license was granted to the individual or to the corporation, because I am considering the two of them as a unit. You are raising the issue that the license granted to the individual could not be transferred and assigned to the corporation.

Mr. Freeman: That is correct.

The Court: That is a matter of law, not a matter of fact. We have got into the record the fact that the license was granted to the individual and then they were incorporated.

Mr. Freeman: If that be so, then we also want to raise the question of law, that a licensee operating under a patent is estopped to deny the validity of the patent. Now, are they doing that here in this court? No. I raise that, then, as a matter of law.

The Court: I think if you want to argue it, you can argue it. I am not saying, however, how far you

(Testimony of Irvin W. Masters.)

will get with it, but at least you have the right to argue it.

Mr. Freeman: The authorities are with us on that, your Honor.

The Court: Well, that is my understanding. If you can show there was a license, that, is, a formal license, I don't know whether this is such a license that would estop Mr. Masters from denying, but if Mr. Masters, that is, the corporation, does not have a specific license, then he is in exactly [689] the same basket as Collins.

Mr. Freeman: That is correct.

The Court: So if you want to make the record——

Mr. Freeman: I want to make the record for this reason, your Honor, and I do not want to appear to be arguing with you, but yesterday Mr. Beehler asked Mr. Masters whether or not from certain drawings he could make one of these fittings, and Mr. Beehler referred to the contention of the plaintiff, and I just want to bring out that there was more to the drawings that were furnished to Mr. Masters than what Mr. Masters had before him when he answered Mr. Beehler's question.

The Court: Well, you go ahead and make your record. I am not going to deny you or anybody else the right to make your record.

Mr. Huebner: Your Honor, may I make one comment on this subject, as long as we are on the point? My recollection is that the letter of notification from Parker purporting to terminate the li-

(Testimony of Irvin W. Masters.)

cense was addressed to the corporation, so that the Parker Appliance Company has treated Mr. Masters, the individual——

Mr. Freeman: I want to see that letter.

Mr. Huebner: ——Mr. Masters, the individual, and Masters, the corporation, as one and the same.

The Court: Well, I don't think this is the place to [690] argue the question of law. This is only the place at this time to get the facts before the court and into the record. I think possibly it is more important to get the facts into the record than it is before the court. So you can proceed.

Mr. Freeman: I think I am in duty bound to straighten out Mr. Huebner on this last statement of his.

The Court: Hasn't that revocation been introduced in evidence? I think it has been introduced. I think it is before the court. What is the number of it?

The Clerk: Exhibit 16, your Honor.

The Court: Let me see it. It seems this is addressed to the individual, not the corporation.

Q. (By Mr. Freeman): Turning to your Exhibit II and Exhibit JJ, I note in one case you use minimum clearances and in another case you use maximum clearances. Will you tell me why the exhibits were so drawn?

A. Well, in the manufacture of parts, parts that are within the tolerances, either the maximum diameters or the minimum diameters that are specified, within the tolerances, are acceptable for use

(Testimony of Irvin W. Masters.)

and such parts as in the one instance were made with a maximum metal condition would have the minimum clearance, and in the other those that were made with a minimum metal condition would have the maximum clearance. We simply wanted to show that fittings made to the 1935 design within those tolerances could have and would have [691] as much clearance as would be accepted by satisfactory in the current fittings. [692]

Q. Isn't it true that you made a comparison of Defendants' Exhibit JJ with Defendants' Exhibit II?

A. Sure, we took advantage of the tolerance.

Q. And those drawings were made for the purpose of comparison? A. Certainly.

Q. And in one case you were talking about minimum clearances and in another case you were talking about maximum clearances?

A. Yes; but we were always within the tolerance.

Q. Wouldn't it have been a little bit better to have made both of them, using the same yardstick for making both of the drawings for purposes of comparison? A. Not for us.

Q. Not for you? A. That's right.

Q. On Defendants' Exhibit O, I take it that the term "in 6 inch size" is really an error?

A. That's right. In the -6 size.

Q. What should it be?

A. In the -6 size.

Q. I don't want to confuse you. Shouldn't that have been size 8?

(Testimony of Irvin W. Masters.)

A. You are correct. You did confuse me.

Q. I didn't intend to confuse you. I am just trying to [693] straighten you out.

A. It should be the -8 size. I don't know how that got on there. Let me see if our reproduction has it.

It is on the reproduction. It certainly should not be there.

Q. Likewise, on Defendants' Exhibit P you also have "in 6 inch size"; I take it you there intend to mean size 6?

A. I didn't put that on there. I don't know why I overlooked it. It shouldn't be there at all.

Q. Didn't you make these drawings?

A. Not those notes down at the bottom. I made the drawings of the sections, but some notes were added down at the bottom by my counsel or his assistants.

Q. I take it on Defendants' Exhibit Q "in 8 inch size" is likewise an error?

A. That's right.

Q. Who put on Defendants' Exhibit Q "assembly of parts AC 811 T"?

A. That is in somebody else's handwriting or printing, not mine.

Q. As a matter of fact, you never saw a drawing that was numbered "AC 811 BT"?

A. What do you mean?

Q. In other words, drawings are numbered; correct? [694]

A. I am afraid I don't understand what you

(Testimony of Irvin W. Masters.)

mean. Here is a drawing that says "AC 811," and "811 BT."

Q. But the drawing is an "AC" type; correct?

A. Well, that is cutting it pretty fine.

Q. The drawing number is 811 BT; correct?

A. Correct.

Q. And it is a Parker drawing?

A. Yes, it has Parker's name at the top.

Q. So that the proper identification on Defendants' Exhibit Q might be "AC type" for the type of device or fitting there illustrated; correct?

A. It is an "AC" type.

Q. And the drawing for the nut is No. 811 BT; correct? A. That's right.

Q. These 6,000 sleeves that were sent out, which did not have the sleeve head angle on them, you said they were used?

A. I didn't say that. I said that they were not returned to us. I presume they were used.

Q. They were inspected, though, were they not?

A. They went through the inspection department.

Q. That is, your inspection department or the inspection department of Lockheed?

A. We do inspect everything that comes into our shop, [695] but we evidently overlooked that thing. We didn't produce these sleeves; we had them produced on the outside, and they were shipped to the customer, and they have an inspection department.

(Testimony of Irvin W. Masters.)

Q. But of your own personal knowledge, you don't know whether they were inspected, or not?

A. I only know what was told me by the inspector?

The Court: May I ask counsel a question?

Mr. Freeman: Yes.

The Court: Another issue has come up, evidently, from the statement of the witness. Supposing it was established by the witness here that he didn't make these sleeves, that he purchased them from the outside?

Mr. Freeman: That doesn't make any difference. He sells them, and he can have them made. He doesn't escape infringement if he has some other shop make them for him. They were made for him.

The Court: Is the infringement in the selling or making?

Mr. Freeman: Both. There are three things, the right to manufacture, the right to use, and the right to sell, and the violation of any one of those——

Mr. Huebner: We concede,——

Mr. Freeman: When I am through, you can talk. The violation of any one of those rights is an infringement. So he has both manufacture and [696] sale.

The Court: Mr. Huebner, then you agree it doesn't make any difference?

Mr. Huebner: Yes. I was just going to save counsel some unnecessary words.

The Court: But he wanted to make the record.

Mr. Huebner: Apparently. He is correct in his

(Testimony of Irvin W. Masters.)

statement on the law, that if an article infringes, the manufacture of it or the use of it or the sale of it constitutes an infringement. However, if the sleeves which Mr. Masters or his company purchased and resold were licensed sleeves, then there would be no infringement attaching. I don't know what the facts are.

The Court: The fact that he had them made on the outside and then brought them into his shop and resold them doesn't relieve him?

Mr. Huebner: That doesn't relieve him if the person who manufactured them for him was not licensed.

The Court: Well, this is the first intimation I have had that he didn't make these sleeves.

Mr. Huebner: I didn't know it, either.

The Court: All right.

Mr. Freeman: I just wanted to know, your Honor, because I want to know what planes those are in, because I don't want to ride in that particular plane. [697]

Q. (By Mr. Freeman): Mr. Masters, do you recall the conversation that you had with Mr. Parker on March 10, 1942, about the time when you were getting into the fitting business?

A. I don't recall that particular date. I recall other conversations, many of them, earlier than that. If you care to refresh my memory as to where it took place, it might help.

Q. Well, do you recall at any time talking to Mr. Parker, that you had gotten into the fitting business

(Testimony of Irvin W. Masters.)

because of the preparedness program, and the heavy demand for fittings, and that you wanted to get yourself in the clear?

A. Well, I don't recall that specifically, no.

Q. It is true that your business set-up, that is, getting into the manufacture of fittings, was brought about by the great demand, first, during the days of preparedness and then, of course, World War II?

A. Well, that made a particularly good opportunity, yes, but I was pretty full of fittings long before that.

Q. Well, of course, you were full of NAF fittings, that is, the two-piece fitting?

A. Well, I was pretty well filled up with the three-piece fittings, too.

Q. You didn't do any independent development or engineering with respect to three-piece fittings, did you? I [698] mean of the kind that you manufacture? A. No.

Q. Now, is it true that when you made Exhibit O, that you used the size 8, and I am now going to ask you, if you made a comparison of the relative proportions of size 8 with the size 4 fitting, would the parts look a little different?

A. In what respect, Mr. Freeman? If you are talking about a dural fitting or a steel fitting—

Q. Yesterday, you made a comparison between plaintiff's drawing, Exhibit 58, and your own drawing, and I am wondering if you took into consideration the plaintiff's drawing, which is in evidence and which has been testified to as representing a

(Testimony of Irvin W. Masters.)

size 4 fitting, whereas your drawing represents a size 8 fitting.

A. Let me see that 58 before I answer that, please.

Q. Here it is.

A. Plaintiff's Exhibit 58 had a single coniform flare seated against the sleeve—on the sleeve—and I did not take into consideration whether it was one size or another. It is in the series where there is a single flare there. I believe my statement would be the more true of size 4, however, namely, that the so-called toe of the sleeve is nearer the end of the flare on the tube than would be the case with the size 8. [699]

Q. I am handing you—

A. I would like to change that statement. I got it just reversed. On the size 4—No. That is right. This illustrates just the nose end being nearer the end of the flare than it would be on the size 4.

Q. There is a little difference, is there not, between the 8 and the 4?

A. Oh, there are differences throughout the whole series. I can't carry them in mind without referring to the drawings. I didn't have time to make all the layouts.

Q. So that a comparison of an 8, which is your drawing, and a comparison of the size 4, which is our drawing, might bring about the appearance of some differences?

A. There might be, but I still think your drawing 58 is disproportioned on the size 4.

(Testimony of Irvin W. Masters.)

Q. I hand you a drawing, Plaintiff's Exhibit 48, and I will ask you to state if that properly illustrates a size 4 fitting. I want to call your attention to the fact that that has been referred to by the witness Wolfram as a drawing of a size 4 initially made 10 times size and then reduced half, so that it is five times size.

A. Well, I would say that this drawing which you just handed me, Plaintiff's Exhibit 48, is more nearly representative of what I believe to be the truth, namely, the contact of the end of the sleeve is much nearer the middle of the [700] flare than in the Exhibit 58.

Q. Do you go along with me that Plaintiff's Exhibit 48 is a fair and accurate representation of a size 4 fitting?

A. I can't testify to that, because there are no reference lines for dimensions. It looks like it, but my recollection was that it was not so stated in the deposition as being exactly.

Q. Just what deposition are you referring to?

A. Amon's deposition.

Q. I call your attention to Defendants' Exhibit P, and will ask you to state if it is not a fact that the clearance between the inside cone-shaped portion of the sleeve and the outside surface of the sleeve is sometimes referred to as a differential angle in the trade?

A. I never heard the term differential angle until the Amon deposition was taken.

(Testimony of Irvin W. Masters.)

Q. Is that the first time you heard of the use of differential angle? A. That's right.

Q. In connection with fittings?

A. That's right.

Q. Upon what did you base your answer, then, on page 608 of the record, and I now read:

“Q. Do you recall in connection with the 817 sleeve the pitch of the flare on the inside of the nut? [701]

“A. Yes. It is 33 degrees.

“Q. Do you recall what the pitch of the angle is on the nose of the body, which is regularly used with that nut?

“A. That is 37 degrees.”

And then you were asked:

“Is or is that not in your opinion a differential angle?”

Then you answered:

“That is my understanding of what is meant when differential angle is referred to.”

A. That's right, and that is based on my education in the deposition.

Q. Isn't it a fact that in the deposition the space that I called to your attention, that is, the space bordered by the inside of the sleeve and the outside of the flare, is the part referred to in the deposition as a differential angle?

A. No, that is not my understanding of what was finally arrived at as the definition. There was confusion between your own witnesses as to what was meant. [702]

(Testimony of Irvin W. Masters.)

Q. Well, there was certainly no confusion as to your understanding as a result of your yesterday's testimony?

A. No; we wound up with an understanding that the differential angle was the difference between the outside angle of the flare or the inside angle of the sleeve, and the angle on the body, which results from consideration of the thinning out of the flare.

Q. You referred to the combination of fittings, on page 607 of the record. Can you tell me where they use AN fittings with 811 fittings, that is, where they interchange the parts?

A. Do you mean some company that does it?

Q. Yes.

A. Well, I know one customer has told me, the Lockheed Company, that they use the 811 bodies in the Constellations, the P-38's, because they had the ship designed to that, and they can't very well change the dimensions. They also use 811 nuts, because it is necessary to use the nuts to get them to screw on the bodies. They are not interchangeable with the AN threads throughout. But that they use, all the time, AN type flares, 10061, and the AN 819 sleeves. Also, your own manual shows the interchangeability of parts.

Q. And when you talk about interchangeability of parts, you are talking now about the use of the AN sleeve or the sleeve with the angle on it, with the nut and body of the 811 type? [703]

A. That's right. And there are other combina-

(Testimony of Irvin W. Masters.)

tions. It is quite confused. You have to follow the chart to know what to do.

Q. Well, let's take the specific one that you know something about. You are now talking about Lockheed's Constellation; correct?

A. That's right.

Q. Do you know whether or not Lockheed, since the introduction of the sleeve head angle by Parker, has used straight wall sleeves?

A. I have no knowledge of that.

Mr. Freeman: I am wondering, Mr. Huebner, can you set me straight as to where you obtained your information that 811 fittings with the straight sleeve angle, that is, the straight sleeve head, was used? You referred to Constellations.

Mr. Huebner: Where did I say that? If you will recall it to me, I will look it up.

Mr. Freeman: On pages 236 and 237 of the record. The court said:

"Let's assume this, that we take the sleeve here and the outside collar of the sleeve was straight, perpendicular, always been used that way. It gave a coupling, but it was not entirely satisfactory. Nobody knew what the trouble was. [704] They experimented. Finally, the Parker people determined to try a certain angle, and it worked. That's all they did, is to change the outside collar of the sleeve.

"Mr. Huebner: From a straight one to an angle.

(Testimony of Irvin W. Masters.)

“The Court: From a straight one to an angle. Aren’t they entitled to a patent?”

“Mr. Huebner: If there was that problem, and if the others had it, and if this was a sudden flash of inspiration or genius, that instead of making it straight, you made an angle and you got a wonderful new result, then they might be entitled to a patent.”

Then you continued your answer:

“But airplanes are flying today. Constellations are flying today without this patent. There wasn’t any real problem. There wasn’t any flash of genius. It was just an engineering idea put on there in order to go through the Patent Office and get a patent.”

Mr. Huebner: That was in my opening statement. If you want to know the facts——

Mr. Freeman: I wasn’t reading from your opening statement. I was reading from page 236 and page 237, when the [705] court made certain inquiry about fittings.

Mr. Huebner: If you want to know the facts, you can ask them of the Lockheed witness that you have arranged to have here in court. We both know his name.

Mr. Freeman: I am asking you.

Mr. Huebner: This not the time to make any such comment or disclosure.

Mr. Freeman: Do you intend to prove the statement that you made?

(Testimony of Irvin W. Masters.)

Mr. Huebner: I don't know. You are producing the witness. I was willing to, but you had him lined up before I contacted him so I let him alone.

Mr. Freeman: That concludes our cross-examination of this witness, except with the understanding that I do want to interrogate him with respect to contributors, some of the letters that he wrote, which is really part of our case. We can go into that now or I can wait, as long as Mr. Masters is going to be around, until we get back onto our side of the story.

The Court: You are not going to present evidence along that line until you present me with a case or two. If you have a case, I would like to read it.

Mr. Freeman: Yes. One that I call your Honor's attention to is the case of Universal Oil Products Co. v. Winkler-Koch Engineering Co., reported in 27 Fed. Supp. 161, by Judge [706] Holly of the United States District Court for the Northern District of Illinois.

Incidentally, that is the famous case involving an oil-cracking process that has gone up and down in all the courts of the country.

In that particular case——

The Court: Don't argue the case; just give me the citation. I want to read the case.

Mr. Freeman: I want to call the court's attention, then, to one paragraph of the decision by Judge Holly.

(Testimony of Irvin W. Masters.)

The Court: Is that the only decision you have?

Mr. Freeman: The one we selected. I didn't know that your Honor wanted a brief on it.

The Court: There are other decisions on it?

Mr. Freeman: There are other decisions to support our position.

I want to read this one paragraph:

“In my opinion good faith requires parties participating in and controlling a case, **but who** are not parties of record, to disclose to the court the fact of such participation, and failing to do so, such parties are not in position to avoid the effect of the judgment as a bar on the ground that there is lack of mutuality of estoppel, if the opposing party subsequently learns [707] of their participation.”

I want to just call your Honor's attention to the fact that Judge Holly did not permit, initially—he overruled a motion when they tried to get into the inquiry and determine the facts, but when the facts were actually developed during the trial, he then changed and came to the conclusion that I have just called your Honor's attention to.

What I say here is that we are entitled to develop with Mr. Masters, as an adverse witness under the rule, whether or not there has been participation by others, and maybe we can set up sufficient information, in the form of discovery, which would justify, then, your Honor coming to the conclusion as Judge Holly did. All I am saying

(Testimony of Irvin W. Masters.)

now is that we are entitled to delve into that particular subject.

The Court: We will reserve any ruling upon the matter at the present time, and if I rule in your favor, why, I will allow you to go into this matter with Mr. Masters.

Mr. Freeman: I also want to call your Honor's attention to another case, which is reported in 85 U. S. Patent Quarterly, *Kendall Co. v. Tetley Tea Co., Inc.*, wherein in the findings of fact the District Court, or the trier of fact, also came to the conclusion that others were contributing to and conducting the suit, and included that in his findings of fact.

The Court: Before we proceed any further, I think we will take our customary morning recess. We will now recess until 15 minutes after eleven.

(A recess was taken.) [708]

Mr. Beehler: Just one or two questions on re-direct examination.

Redirect Examination

By Mr. Beehler:

Q. You testified yesterday, Mr. Masters, in connection with some tests which you made when fittings were drawn up and expanded. In connection with those tests, did you make any measurements of the outside of the sleeve head after the fitting was uncoupled and the pressure released?

(Testimony of Irvin W. Masters.)

A. I did in a few instances.

Q. And what was your finding?

A. That there was no appreciable set or permanent increase in the diameter of the sleeve. In one instance here in a -8 size dural sleeve, the expansion at the shoulder under full torque was .0005 or one-half of one thousandth, and it returned to the original dimension when the pressure was released.

In the midsection of the sleeve head, there was under a torqued condition two thousandths expansion, that is, .002, and when the pressure was released, there was a remaining set of .0005, or one-half a thousandth.

There likewise was one-half thousandth permanent increase in diameter of the toe end of the sleeve, that is, .0005.

The Court: You would say that there was some expansion, [709] wouldn't you?

The Witness: A permanent expansion that remained there after the release of the pressure?

The Court: Yes.

The Witness: A little, yes, very little.

The Court: Well, regardless of whether it was little or much, there was some.

The Witness: That is right. In the midsection and toe end, there was about 25 per cent of the expansion under pressure.

The Court: Well, then, the fact of the matter is when the nut is screwed down upon the sleeve head, there is actual expansion.

(Testimony of Irvin W. Masters.)

The Witness: That is right.

Q. (By Mr. Beehler): Did you make any comparable measurements when the coupling was over-torqued?

A. Yes. Here is a size 8 sleeve that was torqued to 400 inch pounds. The expansion at the shoulder was .004 under pressure and it retained that expansion when it was released.

The midsection retained most of the expansion under pressure, and the nose section had a permanent set of .006.

Q. Mr. Masters, subject to court order, you had an opportunity to secure and examine, I believe, a great number of Parker drawings that had been used in the manufacture of [710] three-piece fittings. You have, have you not, made an examination of the dimensions of those drawings throughout the years?

A. Yes, I have.

Q. What did you find, Mr. Masters, was the case in connection with the amount of clearance between the outside of the sleeve head and the inside of the nut throughout the period of years from 1930 to date?

A. Just a moment. I will have to refer to my notes here and the drawings.

Mr. Freeman: Are you referring to drawings other than those that have been already introduced? If so, I am going to object to this as not proper redirect. Some of the questions were not proper redirect and I kind of let them go, but if we are

(Testimony of Irvin W. Masters.)

going to get into that again, I am going to make the objection.

The Court: Are these new drawings?

Mr. Beehler: If you wish us to produce the drawings from which these observations are made, we will be glad to put them in evidence.

The Court: No.

Mr. Freeman: That was not my objection. If he is going into something that is entirely foreign to what has already gone in, then I am going to make my objection that it is not proper redirect.

The Court: I think you'd better wait until you put your case in chief in. This witness was called as an adverse witness——

Mr. Freeman: No, he is now testifying, your Honor, for the defendants.

The Court: That's right, too. I had forgotten. Well, the objection is overruled then.

The Witness: The drawings in 1930 disclosed that the tolerances were very close, and the maximum clearance between the nut and the sleeve was only .002 of an inch.

In 1935, it had increased to .009 in the 6, 8, and 12 size, but the 4 size had increased to .007.

In 1940, the maximum clearance between the nut and the sleeve in the 4 size was 11/1000ths; in the 6 size was 13/1000ths; in the 8 size it was 13/1000ths, and the 12 size was 13/1000ths.

The minimum clearance in 1930 on the 6 size, the 8 size, the 12 size, was zero.

(Testimony of Irvin W. Masters.)

In 1939—I am speaking of the 811 fittings now—the minimum clearance in the 6 size in 1935, I mean, the minimum clearance was 5/1000ths in the 6 size, 5/1000ths in the 8 size, 5/1000ths in the 12 size.

About 1939 or 1940, the minimum clearance in the 6 size was 7/1000ths, the minimum clearance was 7/1000ths in the 8 size, and 7/1000ths in the 12 size.

So the clearances were increased throughout the years, you see. [712]

Q. How do the clearances compare to current practice?

A. The current practices are of those last dates mentioned.

Q. The current practice is about what it was in 1940, then? A. That's right.

Q. Calling your attention to Defendants' Exhibit JJ, colored section No. 6, in the No. 6 size, according to the notation, dimensions have been taken from the Parker 1935 drawings, were there sizes other than the 6 size as of about that same period, which show clearances comparable to the clearance shown in that particular instance?

A. They were within tenths of thousandths of being the same, but this was the maximum clearance.

Q. Directing your attention now, Mr. Masters, to Defendants' Exhibits depicting the 811 fitting, and particularly Exhibits I, J, and K, I call your attention to the title block in the middle of the lower portion of the drawing, underneath the de-

(Testimony of Irvin W. Masters.)

scription of the particular part, where the legend appears in parentheses "AC 811 type"; is it not your understanding the AC 811 type refers to an Air Corps fitting?

A. Mr. Beehler, I am sorry I don't know them by Exhibits I, J and K. I think I know what you mean, but I want to be sure. [713]

Q. Here they are.

A. Yes, I understand these to be Air Corps 811 fittings.

Q. I also call your attention to a legend immediately above the title block reading as follows: "Protected by U. S. Letters Patent No. 1,893,442"; was it or was it not your understanding that fittings of that description were protected by the patent, the number of which I read?

A. Yes, I took the drawings at their face.

Q. That applies to each one of Exhibits I, J, and K, is that correct? A. That's right.

Mr. Beehler: No further redirect.

Recross-Examination

By Mr. Freeman:

Q. Mr. Masters, with respect to these drawings that you referred to minimum clearances in 1930 for sizes 6, 8 and 12, would you have more clearance today if you provided the same clearance at the top of the sleeve, that is, within the region of contact, when you provided a sleeve head angle or tapered sleeve?

(Testimony of Irvin W. Masters.)

A. I don't believe I understand the question. Perhaps you better reread it.

Q. With the tolerances as you have here testified for the year 1930, with respect to a straight wall sleeve, would [714] you have greater clearance or room for expansion at the lower end of the sleeve if you provided a sleeve head angle?

A. Why, certainly.

Q. And all of your measurements or the data that you took from drawings, in each case related to a straight wall sleeve?

A. Yes, I took it off the drawings as they were.

Q. And in each case that was the clearance at the top of the sleeve, as well as at the bottom of the sleeve?

A. That's right.

Q. So that if you started with the same clearance at the top of the sleeve, and you used the sleeve head angle, you would then have greater room for expansion at the lower end of the sleeve, without possibly coming in contact with the wall of the nut; correct?

A. You would have greater clearance, but it wouldn't be sufficient to provide the space that you now have in the fittings.

Q. You go along with me that the lower end of the sleeve now may expand freely, without coming into contact with the wall of the nut?

A. Well, it doesn't come in contact with the wall of the nut within the torques that are normally applied.

(Testimony of Irvin W. Masters.)

Q. We are agreed that all of the minimum clearances that you referred to for 1930, and then I think you jumped [715] over to 1935 and then up to 1940, for sizes 6, 8 and 12, which were the only sizes that you referred to, all had to do with a straight wall sleeve? A. That's right.

Q. You talked about a fitting that you tested that took what we might call a permanent set; correct? A. That's right.

Q. And in that case the sleeve expanded initially, I believe you said, 2/1000ths of an inch?

A. Yes, that's right.

Q. And then when you released the nut or made a disconnection of the fitting, as would be the case in actual practice, the sleeve contracted $1\frac{1}{2}$ /1000ths of that original 2/1000ths expansion; correct?

A. That's right, in two zones, B and C.

Q. And it is true that if that fitting were used a second time you would start with at least one-half thousandth less clearance than initially?

A. That's right.

Q. Have you carried on any further or continued application of the same fitting, say, to the extent of using it fifteen times?

A. No, I have not in these tests.

Q. Might we assume from your experience in the fitting business that if there was a half thousandth permanent set after [716] the first use, that there might be an additional permanent set after the second use?

A. Well, there probably would be some, but it

(Testimony of Irvin W. Masters.)

wouldn't be in directly proportioned increments, because in the second application the parts are better mated to start with.

Q. You don't know, then, from your own experience, either as a manufacturer of fittings or in preparation for your testimony in this case, what would happen with respect to a sleeve that was used ten times, that is connected and disconnected ten times?

A. Well, I don't know, except this information which is public property, that these fittings do pass the specified test, which requires assembly and disassembly several times.

Q. Well, it is 15, to be exact.

A. And if it expanded each time in proportion to the first time, why, it would be way outside the inside diameter of the nut very quickly.

Q. You have tested fittings in your own plant, that is, where you have assembled the nut, the sleeve, and the body, and have torqued up the nut to the proper torque required by AN specifications; correct?

A. That's right. [717]

Q. You have done that many times?

A. Yes, quite a number of times.

Q. In that case, you then actually took a body with a piece of tubing, flared the tubing, included a sleeve and a nut, and made a complete fitting assembly?

A. For the test purpose, yes.

Q. You, in addition to that, I take it, disconnected the same parts?

(Testimony of Irvin W. Masters.)

A. Not in every instance.

Q. Disassembled?

A. We left many of them assembled in the torqued condition, did not take them apart.

Q. I take it you still have some in the assembled condition? A. That is right.

Q. And did you in these tests or experiments, whatever you want to call them, disconnect some of them? A. Yes.

Q. And then following disconnection of a particular fitting, did you reconnect that fitting for a second operation?

A. Yes. There is one of the tests reported here, I think there was just two disconnects and reconnects.

Q. I am asking now of those you have tested and worked on and operated during the last three or four years as [718] a manufacturer, have you in any case assembled and disassembled a fitting more than once?

A. I believe so. I haven't heretofore conducted any formal tests. Just general observation as to how they were.

Q. When I say you, Mr. Masters, I am also including any people in your employ, that is, within your organization.

A. We don't have a hydraulic laboratory or occasion to conduct tests like that.

Q. Have you ever sent any of your fittings out for hydraulic laboratory tests so that you might know what they do or accomplish?

(Testimony of Irvin W. Masters.)

A. We sent a number of our fittings to Wright Field for test, to see that fittings made by our process of manufacture were satisfactory.

Q. And when you send those out, you send the same component number, that is, a size 6 sleeve to go with a size 6 body and a size 6 nut?

A. No, we did not. We just sent bodies. The question was whether or not the parts made from plates or extrusions were as good as parts made from forgings.

Q. Have you ever sent out a complete fitting, that is, the three parts, the sleeve, the nut, and the body for test purposes? A. Not that I recall.

Q. At no time? [719]

A. Not that I recall.

Q. Then the only test that you ran for purposes of determining what happened after the first connection of a fitting was the one you have here referred to wherein the sleeve took a permanent set?

A. Well, the only one, I would say, was in connection with the tests just recently run.

Q. You didn't testify about more than one, did you, on your redirect, or at least, maybe it was two. I am just trying to get the facts, Mr. Masters?

A. Well, I believe I was only called upon to testify as to one. I see notations made on two of them here that were that way.

Q. Would you give us the facts then with respect to the second one?

A. Yes. There was one that was torqued to 200 inch pounds, size 8, dural assembly. The expansion

(Testimony of Irvin W. Masters.)

at the shoulder of the sleeve was zero. That was, of course, no fit.

The expansion midsection of the sleeve was .00275. The set was one thousandth, that is, .001.

At the toe, the expansion was .0035 and the set there was 5/1000ths or 5/ 10 thousandths, .0005.

Q. So that the second time that that particular sleeve would be used, the angle would be a little bit less; [720] correct?

A. The sleeve head angle you are talking about, on the outside?

Q. That is right. A. Yes, it would.

Q. Did you testify on one of the devices that you tested that the sleeve took a permanent set of 6/1000ths?

A. I believe I did, in excess of 6/1000ths. No, hold on a minute. Let me look at my tables here. No, I did not testify as to the set; I simply testified as to the expansion, Mr. Freeman.

Q. Well, I may be wrong, but I made notes when you testified that you said the nose retained 6/1000ths set. I may be wrong.

A. What specimen were you talking about or what exhibit?

Q. The one you torqued up to 400 pounds.

A. Well, I don't have those figures here.

Q. You just a moment ago, on direct examination, said you torqued one up to 400 pounds. Were you then testifying from some notes that you have?

A. That's right.

Q. Well, assuming that for the moment, let me

(Testimony of Irvin W. Masters.)

ask you this question, and we can check the record a little later: If the nose had expanded or took a permanent set of $6/1000$ ths, [721] then in the 1935 drawings on the 811 fittings which you referred to, with a $5/1000$ ths clearance, you would have actually had contact with the wall of the sleeve; correct? A. What size was that on?

Q. Oh, size 8.

A. If it was at the minimum clearance, there would have been a contact. If the parts were at the maximum clearance, there would not have been.

Q. I am just using the figures you gave us from the Parker drawings wherein you said that the '35 drawings showed $5/1000$ ths clearance, minimum clearance, in the sizes 6, 8, and 12.

A. That's right.

Q. And your testimony with respect to one of the demonstrations or tests that you made in over-torquing size 8 to 400 pounds—I thought you said that the nose expanded $6/1000$ ths, that is, took that kind of a set. I am now asking you, if it did take such a set, would it not be a fact that the nose would engage the wall of the nut?

A. If the parts were at minimum clearance.

Q. I am just taking the very figures you gave us.

A. That is what I gave you. Those figures were for the minimum clearance.

Q. And under those conditions, you would have a sleeve engaging the nut? [722]

A. If it did take that set, yes.

Q. And, thereafter, any additional expansion of

(Testimony of Irvin W. Masters.)

the sleeve would be backed up or resisted by the constraining force of the nut proper; correct?

A. That is right.

Q. And in such case the rotation of the nut would be resisted by its engagement with the wall of the sleeve?

A. If the sleeve clung fast to the tubing, [723] yes.

Q. There would be that frictional resistance of two mating surfaces engaging each other?

A. Sure, there is under any condition.

Q. And, likewise, the condition that we have here set up would in a measure prevent the backing away of the nut for removal purposes or disengagement or disconnection?

A. It might hinder it, and if the interference became great enough, prevent the nut from separating from the sleeve.

Q. So that in connection with over-torqueing, the sleeve head angle does provide greater clearance at the lower end of the sleeve?

A. When you say "lower," you always mean the toe end?

Q. Yes, the smaller diameter end.

A. Certainly, if there is more space there is more space.

Q. That prevents the possibility of sticking in the event of some over-torqueing of the nut?

A. That gives you some advantage, yes.

Q. And you usually find out that advantage out in the field where a repair or replacement is to be

(Testimony of Irvin W. Masters.)

made, as distinguished from initially when the airplane is just being assembled in the plant?

A. That I don't know from experience.

Q. Well, in the event of an over-torqued nut, or in the event of engagement of the angle on the sleeve, that wall, [724] with the wall of the nut, you usually find that out when you bring about a disconnection or disassembly of the parts; correct?

A. Well, that would logically seem so. I have not had experience with it.

Q. Have you had any experience in the service of aircraft in combat or in airports with respect to connections and disconnections made in hydraulic systems?

A. Not directly, Mr. Freeman, in modern aircraft.

Q. When we talk about modern aircraft, I take it that you are taking in 'since 1940 on?

A. That's right.

Q. So you have little or no experience with respect to service requirements in connection with the fittings of the kind here involved?

A. Not personal experience, no. I have quite a bit of information on the situation; not experience.

Q. You do agree with Mr. Wolfram that jamming of the sleeve with the nut is not desirable?

A. That's right. If the parts can remain free, there is greater ease of assembly.

Q. And you likewise agree with Mr. Wolfram that the greater area of contact between the shoulder of the sleeve and the shoulder of the nut, the more

(Testimony of Irvin W. Masters.)

uniform and the better the distribution of pressures applied by the nut on the sleeve [725] as the nut is brought home?

A. Well, I don't believe that that is critical.

Q. Are you now saying that there are certain tolerances with respect to the amount of contact and distribution of pressures?

A. Yes, there is a considerable safety factor in all design of aircraft components. I would say that that safety factor must be wide enough that slight variation in that dimension wouldn't make much difference.

Q. Do you then go along with me, using your own term, that you have a greater safety factor when you have greater area contact between the shoulder of the nut and the shoulder of the sleeve?

A. Well, you don't gain anything when you exceed a requirement. I couldn't answer on that. Obviously, if you develop strength throughout the other sections of the components, proportionate to the increased load that you could impose on the two surfaces by increasing them, why, you would have greater total strength. But I don't believe that that is the case.

Q. It is true, is it not, that in fittings, particularly those used in hydraulic systems of airplanes, that it is desirable to have the unit as small as possible and yet have maximum strength?

A. Well, of course there is always the desire to keep [726] the weight down and a part small. But the matter of reduction of size also can be carried

(Testimony of Irvin W. Masters.)

too far. To assemble the parts you need some size in your parts to carry the loads. It is a balancing of a good many factors there. Usually a fellow can juggle the factors to suit what he wants to do.

Q. Do you go along with me that small dimensional differences are important in hydraulic fittings?

A. It depends upon the situation, whether or not they are important. I wouldn't say when you have a safety factor of 5 to 1, in other words, that the strength of your component is 500 per cent of what is required, that a reduction of an area of 6 or 7 per cent would affect anything much.

Q. What is the factor of safety used in connection with hydraulic fittings for aircraft wherein you have 1500 pound pressure systems, do you know?

A. That I am not currently too familiar with, but I believe that design factors are kept in the 4 or 5 to 1 ratio.

Mr. Freeman: That is all.

Mr. Beehler: At this time I wish to offer into evidence as Defendants' Exhibit next in order Parker Catalogue Price List No. 202 C, which was previously offered in evidence as Defendants' Exhibit A in the Cleveland depositions.

The Court: It may be admitted. [727]

The Clerk: PP.

(The catalogue referred to was marked Defendants' Exhibit PP, and was received in evidence.)

Mr. Beehler: I also wish to offer in evidence the deposition of Charles H. Wagner, Jr., taken May 6, 1949, in Cleveland.

The Clerk: QQ.

The Court: It may be admitted.

(The deposition referred to was marked Defendants' Exhibit QQ, and was received in evidence.)

Mr. Huebner: We will offer in evidence, also, your Honor, a certified copy of the file wrapper and contents of the Parker patent 2,212,183, which is the patent in suit.

The Court: It may be received.

The Clerk: RR.

(The document referred to was marked Defendants' Exhibit RR, and was received in evidence.)

Mr. Freeman: Does that include the references, Mr. Huebner?

Mr. Huebner: I will offer them separately. The references, naturally, are recited in the file wrapper, but they will go in as separate exhibits. [728]

I next offer in evidence a stipulation in the case of Parker vs. Masters. This stipulation relates to the use of uncertified copies of patents, and also to the fact of a certain publication, photostat of which is attached, and Mr. Freeman and I have an understanding that the identical stipulation may be assumed to be in effect with respect to the Collins case.

Mr. Freeman: That is correct. We raise no technical objection.

The Court: It may be received.

(The document referred to was received in evidence and marked Defendants' Exhibit SS.)

Mr. Huebner: I have to offer in evidence, assembled in a folder, certain prior patents which were pleaded in the answer, in addition to some Parker patents that are already in evidence. I think they might be marked as a main letter exhibit with subdivisions or numerals.

The Court: It may be so marked.

The Clerk: Exhibit TT.

Mr. Freeman: Mr. Huebner, are those all that were set up in the answer, or have you selected——

Mr. Huebner: We have missed one or two that were in the answer. I can't tell you exactly.

Mr. Freeman: Have you got on extra copy of those?

Mr. Huebner: No. I assumed you had ordered some for [729] yourself.

Mr. Freeman: All right.

Mr. Huebner: If you don't have any, we can loan you our expert's set perhaps.

Mr. Freeman: I have got a set following the answer, but I thought you changed them somewhat? So that's all right.

Mr. Huebner: These are arranged, and I would like for the record to show what they are, if the court please. These are arranged in numerical order

and I would like to have the record show which subdivision each patent is, so that there can be no mistake. The Abbott patent, 46603, will be the first in order.

The Clerk: TT-1.

Mr. Huebner: Buzzell 177686.

The Clerk: TT-2.

Mr. Huebner: Guyer 182435.

The Clerk: TT-3.

Mr. Huebner: Guyer 196084.

The Clerk: TT-4.

Mr. Huebner: McConnell 290446.

The Clerk: TT-5.

Mr. Huebner: George, 326425.

The Clerk: TT-6.

Mr. Huebner: Potts, 406060. [730]

The Clerk: TT-7.

Mr. Huebner: Anderson, 535236.

The Clerk: TT-8.

Mr. Huebner: Jordan, 654735.

The Clerk: TT-9.

Mr. Huebner: Dossert, 7721836.

The Clerk: TT-10.

Mr. Huebner: Reed, 964,315.

The Clerk: TT-11.

Mr. Huebner: Brown, 1,058,542.

The Clerk: TT-12.

Mr. Huebner: Bachman, 1,352,342.

The Clerk: TT-13.

Mr. Huebner: Benzion, 1,680,080.

The Clerk: TT-14.

Mr. Huebner: Hewitt, 1,820,820.

The Clerk: TT-15.

Mr. Huebner: And Parker, 1,977,241.

The Clerk: TT-16.

(The documents referred to were received in evidence and marked Defendants' Exhibits TT, TT-1 to TT-16, inclusive.)

The Court: Well, Mr. Huebner, before you produce any more documents, I think we will recess. We will now recess until 2:00 o'clock this afternoon.

(Thereupon, an adjournment was taken to 2:00 p.m.) [731]

Friday, June 23, 1950—2:00 P.M.

(Other court matters.)

The Clerk: Further trial in the Parker case.

Mr. Huebner: For the convenience of the court, I will hand up three photostatic pages corresponding to the photostatic sheets in the stipulation, Defendants' Exhibit SS. I will ask Mr. Bumb to take the witness stand.

RICHARD C. BUMB

called as a witness by and on behalf of the defendants, having been first duly sworn, was examined and testified as follows:

The Clerk: Your name?

The Witness: Richard C. Bumb.

(Testimony of Richard C. Bumb.)

Direct Examination

By Mr. Huebner:

Q. Mr. Bumb, were you subpoenaed to appear and testify in this case? A. I was.

Q. By whom are you employed?

A. North American Aviation.

Q. Where are they located?

A. Inglewood, California.

Q. Will you recite very briefly your personal history in connection with any hydraulic installations or equipment? [732]

A. I first did work on hydraulics about the first of the year of 1934, and have been with it since that date with the exception of approximately two and a half years.

Q. What is the nature of your work in connection with hydraulics?

A. At the present time I am what is classified at North American as a hydraulic group leader, which means that I have charge of the people who design, install, and generally supervise hydraulic installation in aircraft.

Q. Do you have any personal knowledge of plumbing equipment, and by that I include tubes and fittings, in the North American Navion airplane? A. Yes, I do have.

Q. And particularly in the North American commercial Navion airplane? A. Yes.

Q. In your commercial airplanes is your company required to use the Army-Navy standard spe-

(Testimony of Richard C. Bumb.)

cifications on the hydraulic fittings, the flare tube fittings, that they employ?

A. That question will have to be answered not yes or no. I believe generally speaking the CAA suggests the use of AN standard fittings on commercial aircraft. However, in the case of the Navion, specifically, we were able to demonstrate satisfactory performance with other fittings [733] than the AN fitting.

Q. Did North American Aviation employ in the commercial Navion aircraft manufactured by that company other than the AN standard fittings?

A. Yes, it did.

Q. Was that selection by the choice of the corporation? A. Correct.

Q. What type of fittings were employed?

A. They used the commercial Weatherhead, so-called inverted flare, or what is generally known as the SAE inverted flare fitting.

Q. Is that a two or three-piece fitting?

A. That is a two-piece.

Q. About how many planes were manufactured by North American Aviation having that Weatherhead inverted flare fitting?

A. Approximately 300.

Q. What pressure system was required in those planes? A. A thousand pound system.

Q. What kind of material went into the fittings?

A. The fittings generally were brass.

Q. During what period of time were these planes manufactured?

(Testimony of Richard C. Bumb.)

A. About from the first of 1935, I would estimate, for [734] the next 18 months.

Q. Did you mean '35, or '45?

A. No; '45.

Q. From '45——

A. '45 to the middle of '46, approximately.

Q. Have you made any personal observation as to whether the plumbing or piping in the Navion was satisfactory?

A. It was quite satisfactory.

Q. Did North American Aviation have any transaction with Ryan Aeronautical in connection with fittings? A. Not to my knowledge.

Q. Did North American Aviation sell the manufacturing rights on the Navion thereafter, about 1946 or '47 to Ryan Aeronautical?

A. Yes, it did.

Q. And, therefore, North American no longer manufactures the Navion? A. Correct. [735]

Q. Are you able to assign any reason why North American Aviation chose the Weatherhead SAE inverted flare type fitting, rather than the AN standard, for the Navion airplane?

A. There were probably two reasons for that. One was the fitting was cheaper and, of course, to build a commercial aircraft, cheapness is an important item. Then the other item is that inasmuch as the airplane was to be in the hands of the general public, that it was considered it was more convenient to be able to buy the Weatherhead fitting at any super drug store.

(Testimony of Richard C. Bumb.)

Q. I assume, and I am leading you because it is a well-known fact, North American Aviation does manufacture some aircraft for the government, doesn't it? A. Correct.

Q. Will you give the model identification of a couple of the important models?

A. The F-86, called the Sabre, and the B-45.

Q. The B-45 is a bomber? A. Correct.

Q. And the F-86 is a fighter plane?

A. Correct.

Q. In the current production of those planes, which are for the government, your corporation does use a three-piece standard AN fitting, doesn't it? [736] A. That is correct.

Q. And that is because you are required to do so? A. Right.

Q. Are those three-piece AN standard fittings leakproof or troublefree?

A. Not absolutely.

Q. What has happened that you know of in connection with trouble or difficulty?

A. We have had, particularly on the F-86, a reasonable amount of leakage, usually being associated with cracked flares of the aluminum bronze type.

Q. Have you had any experience with reference to sealing of the steel tubing on these AN standard fittings?

A. Only that a considerably higher torque value is needed to accomplish sealing than the Army recommends, and a certain amount of failure to get sealing at any torque.

(Testimony of Richard C. Bumb.)

Q. What does the Army recommend on, for example, a No. 4 seal fitting?

A. It recommends an average—it has a recommendation of a maximum and a minimum and, I believe, the average of that recommendation on a quarter-inch is about 70-inch pounds torque.

Q. Even at double that, do you obtain uniform sealing of the steel fittings?

A. No. North American's own policy on torque is to [737] approximately double the Army's suggestion and at that point we find in some cases we need even excess torque.

Q. Now, these AN fittings North American has obtained and used, were any of them manufactured by Parker Appliance Company? A. Yes, sir.

Q. Who all does your corporation buy fittings from?

A. We buy fittings from Collins and from Parker and in minor quantities from four other concerns.

Q. When your corporation orders what you and I have referred to as fittings, does it order a fitting as a three-piece assembled unit, or do you order the individual parts that are to be eventually assembled?

A. We order them as individual pieces.

Q. And is it your practice, that is, your company's practice, to order one part, a quantity of one part from one company, and another part from another company?

(Testimony of Richard C. Bumb.)

A. I couldn't answer that authoritatively, but I would say it is my opinion, yes, that the parts are ordered indiscriminately.

Q. That is true so far as you are aware of your company's activity, is that right?

Mr. Freeman: He has already given you his answer that he was only giving his opinion. I don't see how you can ask him what his company does. I object to it. [738]

Mr. Huebner: You mean you move to strike out what he said? It is too late to object.

Mr. Freeman: I still make my objection.

The Court: There is a question before the court. I think the objection is good to the last question.

The Witness: I could go on further with the original question and say my opinion would be based on the general operation of that sort of thing, that the parts would be ordered indiscriminately from one company or another.

Mr. Freeman: I renew my objection, your Honor.

The Court: Overruled.

Q. (By Mr. Huebner): Now, have you observed any more trouble with, let us say, the fighter, the F-86, or the bomber, the B-45, or vice versa?

A. Yes. We have experienced more trouble on the F-86 than we have on the B-45, yes.

Q. Can you explain that difficulty?

A. The difficulty seems to be primarily connected with the ease of installation. The B-45 is a larger airplane and has a better opportunity to get at the fittings, whereas the F-86 is a small congested air-

(Testimony of Richard C. Bumb.)

plane with more difficulty of getting at the fittings. That is, at least, considered to be the situation. However, the matter might also be because of the element of vibration.

Q. In your position as hydraulics man for [739] North American, would you say that the AN standard three-piece fittings have been a panacea for what problems were encountered in the hydraulic installations in airplanes? A. No.

Q. Are you aware of any propaganda on the part of the aircraft companies to go from a three-piece flared type fitting, of which the AN is merely one example, to a flareless tube type of fitting?

A. Yes, I am.

Q. Will you tell the court what you know about that?

A. Well, there has been generally—during the past two and two and a half years, there has been some considerable effort made on the part of aircraft manufacturers for the use of the so-called flareless fitting. A considerable amount of laboratory testing has been done by several companies, which seems to indicate the superiority of that type of fitting.

Q. You are familiar with the general indication of an AC-811 type fitting and the AN standard fitting, I presume? A. Yes.

Q. Did North American Aviation manufacture any trainers using the AC-811 fitting?

A. Yes, we did. [740]

Q. About how many?

(Testimony of Richard C. Bumb.)

A. I believe that we manufactured a tremendous number of them. I wouldn't swear, but I believe we went up to 50,000 trainers. It was in the thousands, in the tens of thousands.

Q. Did most of those employ an AC 811 fitting?

A. Yes, they all did.

Q. Did you experience any amount of trouble with those trainers? And I am confining my question relating to trouble to the hydraulic system, and particularly the fittings. Do you want the question read?

A. No, I believe I have it.

I would say that up until the time we were able to get the proper tubing we had considerable trouble. We had a reasonable amount of trouble in the early phases of the manufacturing of that airplane to find the proper tubing to use. But after we began using what we considered the proper tubing our troubles were low on leakage.

Q. What would be the comparison as to trouble that your corporation experienced with the AC 811 systems on the trainers as against the AN steel used in other airplanes?

A. I would say there would be an appreciable increase of trouble, a great deal more trouble, being experienced today than there was then.

Q. What would be your personal preference with respect [741] to the use of fittings in aircraft today? Would you recommend the use of the AN standard three-piece fitting, or the use of a flareless fitting?

(Testimony of Richard C. Bumb.)

Mr. Freeman: I object to that as immaterial. A flareless fitting isn't involved here.

Mr. Huebner: We are contrasting what you think is the greatest thing the world has ever seen with this witness, who is a practical man in hydraulics, thinks would be better.

The Court: Objection overruled.

Mr. Freeman: I will withdraw my objection. You go ahead and let him answer.

Mr. Huebner: The court has overruled the objection.

The Court: You may answer.

The Witness: North American has gone along with the greater proportion of hydraulic aircraft manufacturers in recommending the use of the Ermeto fitting, or the flareless fitting.

Q. (By Mr. Huebner): That word "Ermeto," is that the name of an individual whose name is attached to a flareless type of fitting?

A. That is the name of the individual who is associated with the type of fitting.

Q. I want to repeat, do you personally subscribe to the opinion of the aircraft companies, which you say have expressed a preference for Ermeto or flareless type tubing? [742]

A. I frankly have a question in my mind on that. I think the Ermeto or flareless fitting is far superior as a fluid sealing means; I question whether in some installations it is as good. It is an installation problem, not a fitting problem, in the strictest sense.

(Testimony of Richard C. Bumb.)

Mr. Huebner: You may cross-examine.

Cross-Examination

By Mr. Freeman:

Q. Will you name the four other companies that your——

A. I am sorry I can't. I only noted in my mind the two people involved. I can tell you we procure from Collins and Parker, but I can't tell you who else we procure from.

Q. Will you be kind enough to look that up and call Mr. Huebner so that he can make a statement on the record of the names of those four companies for me? A. I can.

Q. Your company manufactured, you say, thousands of trainer planes? A. Right.

Q. When did that program start?

A. That program started back about in 1936, I believe.

Q. Did that program continue on into 1940?

A. Right.

Q. '41? [743] A. Right.

Q. '42? A. Right.

Q. '43?

A. In fact, it is continuing today. Not in the manufacturing stage, but in the reworking stage.

Q. Do you use the 811 fitting today?

A. We are still using the same fitting.

Q. Are those fittings with the sleeve being provided with an angle on the outside?

A. I don't know.

(Testimony of Richard C. Bumb.)

Q. So that when you said 811 fittings, you do not know whether those included the old style 811 with the sleeve—that is, the wall of the sleeve parallel with the wall of the nut, as distinguished from the tapered sleeve; correct?

A. No, I couldn't say that.

Mr. Freeman: That is all.

The Court: May I ask the witness a question? Do you understand what is meant by the Parker type fitting?

The Witness: I believe I understand some of the elements that they claim there.

The Court: Well, your company uses a great many of the Parker type fittings, do they not?

The Witness: That's right, the old 811.

The Court: Would you consider this fitting that you used [744] as a great commercial success, so great that it overshadowed any other fitting in the market?

Let me put it this way: Up to the time of the use of the Parker fitting there had been many fittings used; when the Parker type fitting came along with a particular sleeve, was that such a commercial success that all the companies, or your company, immediately started using that particular fitting?

The Witness: Of course, relative to the use of fittings with aircraft manufacturers who are manufacturing for the government, it is not a matter of particular choice. I mean we have the so-called AN standard parts, which when they are made in AN standard parts, we have to use them or bear the

(Testimony of Richard C. Bumb.)

burden of the proof of proving that something else is better. So the general tendency, therefore, is when a part has been made an AN part, to use it.

The Court: Well, where you had a choice of fittings, where it wasn't designated that you use an AN fitting, would you consider the AN fitting so superior that you didn't use any other fitting?

The Witness: We didn't use it in the cases where we had the choice.

The Court: You didn't use it where you had the choice?

The Witness: No.

The Court: That is all. [745]

Mr. Huebner: Mr. Harold Adams.

HAROLD W. ADAMS

called as a witness by and on behalf of the defendants, having been first duly sworn, was examined and testified as follows:

The Clerk: Your name, sir?

The Witness: Harold W. Adams.

Direct Examination

By Mr. Huebner:

Q. Mr. Adams, what is your age?

A. Thirty-nine.

Q. Where do you reside?

A. Santa Monica, California.

Q. By whom are you employed?

A. Douglas Aircraft Company.

(Testimony of Harold W. Adams.)

Q. This is preliminary, so I will ask a leading question. You are experienced in the matter of hydraulic fittings, are you not? A. Yes, sir.

Q. Now, will you briefly or at such length as is necessary to incorporate all the material subject matter, outline for the court for some years past your experience in connection with hydraulic equipment, and particular hydraulic fittings?

A. My close association with hydraulic equipment and [746] fittings started in 1934, when I was appointed hydraulics engineer for the Douglas Aircraft Company. From 1934 till February, 1941, I acted in this capacity as hydraulics engineer for the Douglas Aircraft Company. At that time I was advanced to a position where I was in charge of the design work on the mechanical and equipment installations, which included power plant design, armament, and electrical instrument design. That lasted until April, 1945, and since that time I have been chief design engineer at the Santa Monica plant of the Douglas Company.

Q. How many men are in your department there? If it isn't a confidential matter.

A. That is all right. Do you mean technical men, or everybody——

Q. Everybody that comes under your general direction as design engineer.

A. There would be about 500 altogether.

Q. Over any period of time have you supervised work of the designing installations for piping and carrying of fluids under pressure?

(Testimony of Harold W. Adams.)

A. Yes, during all the period since December, 1934.

Q. Were you at any time connected with the Society of Automotive Engineers Committee for Standardization of Aircraft Hydraulic Equipment?

A. Yes, I was the first chairman of that committee. [747] At the time the committee was started in furtherance of their effort, this was Committee A6 of the Society of Automotive Engineers, I was chairman, and I remained chairman from June, 1941, until August, 1943, at which time I resigned due to pressure of other work. [748]

Q. Have you written any papers in connection with design or shop problems in high pressure hydraulics?

A. Well, I have written a number of papers, one which was quite well known and was published in the SAE Journal. That was a paper that was entitled, "Design and Shop Problems in High Pressure Hydraulics." That discussed the work the Douglas Aircraft Company had been doing with systems operating at pressures of 3,000 pounds per square inch. Most of the systems until that time had been operating on pressures of 1,000 pounds per square inch. This paper described the Douglas Aircraft Company's work which was instrumental in getting a good many of the other aircraft companies to increase the pressure of their hydraulic systems to 3,000 pounds per square inch.

Q. About October, 1940, did you have anything

(Testimony of Harold W. Adams.)

to do with suggesting a modification of the AC 811 tube fitting?

A. Yes. In the fall of 1940, we had an airplane crack up, that is, it made a wheels-up landing, which damaged the airplane considerably, as a result of a mechanic over-tightening the fitting and squeezing the tube until when pressure was applied to it, it blew out and lost the fluid from the hydraulic system in flight, so that the landing gear was inoperative and the airplane cracked up.

So I determined then, as part of my job as hydraulics engineer, to do something about the fittings to prevent their [749] failure as a result of over-tightening. So I did do this work, reported it, and sent a report to the Air Corps. The Air Corps, I think it was in February, 1941, wrote a report in which they acknowledged the Douglas Company's contribution and recommended that this modification be incorporated in the AC 811 fitting.

Q. What was that modification?

A. That was the cutting away of the inside of the sleeve on the smaller size of fittings up to and including the -6 size.

Q. Would that be what is illustrated in Defendants' Exhibit P?

A. Yes, that is right. The fitting originally had an angle and we cut it way at a considerably greater angle at this point.

Q. You are pointing out to the court the additional angle at the nose end of the fitting?

A. That's right, the 18½-degree angle.

(Testimony of Harold W. Adams.)

Q. I mean on the nose end of the sleeve.

A. I am pointing to the $18\frac{1}{2}$ -degree angle.

The Court: What was the effect of the cutting away of that sleeve?

The Witness: The fittings, when they are over-tightened severely, crush the tube out from between the sleeve and the nose of the fitting in such a way that only a parallel portion [750] of tube is left. The tube is simply crushed out completely from between the sleeve and the nose of the fitting, so that only a paper-thin portion, you might say, of the original tubing material is left there.

Then when pressure is applied, a little vibration, or anything of that sort is applied, the tube is free to simply back right out of the fitting and, of course, there is no joint any more.

So the cutting away of this angle has the effect, when the fitting is badly over-tightened, the inner portion of the sleeve never comes up against the nose of the fitting, so that when the sleeve finally bottoms and stops its forward movement as the nut is over-tightened, there is still a sort of a tapered flare remaining, and this tapered flare is sufficient to hold the pressure and keep the tube from backing out of the fitting.

Q. Would this fitting, which I hand to you and which has not yet been marked, illustrate the pinching off of the tube from over-tightening, to which you have referred?

A. That's right. This photograph was——

Mr. Huebner: Just a minute. Let me have it

(Testimony of Harold W. Adams.)

marked in evidence so that the court may have a copy.

The Clerk: UU for identification.

(The exhibit referred to was marked Defendants' Exhibit UU for identification.) [751]

The Court: It may be marked for identification.

Mr. Huebner: I would like to have it marked in evidence, your Honor, and shortcut things that way. It illustrates the testimony, and I will later identify where it came from.

The Court: It may be received in evidence then.

(The exhibit referred to was marked Defendants' Exhibit UU and received in evidence.)

Q. (By Mr. Huebner): Now, proceed with your answer. While you are at it, in giving your answer, state, if you know, where this photograph originated?

A. Yes. This photograph was taken under my direction at the time that I made this series of tests to improve the AC811 fitting. This one shows a fitting which has been very severely overtightened. Points of interest are that the nut has failed at its extreme right-hand in the photograph, right-hand end, and that the tube is completely squeezed out from the between the fitting and the sleeve. In fact, the outer end of that flare has been pinched off and squeezed up into the space between the threads in the nut and the body. The tube is now simply

(Testimony of Harold W. Adams.)

a parallel piece of tubing which can pull out from the fitting at relatively low force.

This was made at the Douglas Aircraft Company, and this No. 22697 is a Douglas Aircraft Company photograph number 752.

Q. Now, referring back for a moment to your qualifications and experience, have you written any textbooks on hydraulics?

A. Yes. I wrote a textbook which was published by McGraw-Hill in 1943, entitled "Aircraft Hydraulics," which is fairly well known in the industry.

Q. Is that book widely used as a textbook for the design of aircraft hydraulic systems?

A. Well, I have gotten some pretty good royalties from it. It has been sold widely, at any rate.

Q. Do you have any attachment to the California Institute of Technology?

A. Yes. I have given a series of lectures to the graduate students of the California Institute of Technology for a good many years on the subject of landing gear and hydraulic system design.

Q. Have you read the Parker patent in suit?

A. Yes, sir.

Q. Have you examined the prior patents which have been marked in evidence as Defendants' Exhibits TT, with sub numbers 1 through 16, inclusive?

A. Yes, I have.

Q. And have you examined the two Parker patents which are referred to in the patent in suit as

(Testimony of Harold W. Adams.)

being the forerunners of the patent in suit? [753]

A. Yes.

Mr. Freeman: Did you give the court a copy of the prior patents?

Mr. Huebner: I think the court has a copy in that red folder.

The Court: No, I haven't a copy.

Mr. Freeman: I have an extra work copy. I would be glad to hand it to the court for convenience.

Mr. Huebner: Here it is right here.

Mr. Freeman: That is the original.

Mr. Huebner: The court can use that, or we can give him an extra copy.

Mr. Freeman: I have an extra copy he can keep and mark up, or do anything he wants with.

Mr. Huebner: All right. Thank you.

Mr. Freeman: You can check it over to be sure I haven't slipped anything in it.

Mr. Huebner: I am sure you wouldn't be that bold, Mr. Freeman.

Q. Now, will you go with me down through the patents that are in the prior art book and briefly point out to the court what each one discloses, identifying them as you go along by the name of the patentee and the number of the patent. We will start with Abbott No. 46603.

A. The patent, Abbott 46603, illustrates a three-piece [754] fitting in which the body, referring to Fig. 1, in which the body is designated by the larger letter C, the nut by the large letter B, the

(Testimony of Harold W. Adams.)

sleeve by the small letter b, and the tube by the large letter A. The nut is tightened up on the body and forces the sleeve into contact with the back of a flare on the end of the tube, which is then forced into contact with the nose of the body.

Mr. Huebner: Now, before we go to the next one, your Honor, I want to make a comment as we go along concerning whether the patents were or were not file wrapper reference. This patent, Abbott, was not cited by the Patent Office during the prosecution of the patent in suit.

Q. Now, referring to the next one, which is Buzzell 177686, will you go through that?

Mr. Huebner: That was not a file wrapper reference, either, your Honor.

A. Buzzell 177686 illustrates in the cross-section in Fig. 2, if we refer to the left-hand—to either hand, actually, but the left-hand end of Fig. 2, a three-piece fitting in which A at the bottom of the figure designates the body, F at the top of the figure designates the nut, G designates the sleeve.

The nut F, forces the sleeve G onto a tube designated by I, which is forced over the nose of a conical ridged, in this case, conical surface on the Body H. [755]

Q. Refer now to Guyer 182435.

Mr. Huebner: And this was not a file wrapper reference, your Honor.

A. Guyer 182435 shows a three—well, this is a union that has essentially the same arrangement as the three-piece fittings which we have been de-

(Testimony of Harold W. Adams.)

scribing. Referring to Fig. 1 at the left-hand end, E is a nut, D is a sleeve, C is a body, and A is a tube.

Referring to Fig. 2, the tube has been flared so that it fits over the double conical nose of the fitting C and is held onto the fitting by the nut E through the sleeve D.

Q. Refer next to the Guyer patent 196084.

Mr. Huebner: Which, your Honor, also was not a file wrapper reference.

A. Guyer No. 196084 in Fig. 2, or the right-hand end of Fig. 3, illustrates a three-piece fitting, which is essentially the same as the previous Guyer patent, in that it has a body C with a double conical nose. The tube L has been flared and slips over the nose of the body. The flare is held against the body by a sleeve A, which is held in place by a nut B.

Q. Turn next to McConnell 209446.

Mr. Huebner: This was not a file wrapper reference, your Honor.

A. McConnell 209446 shows in Fig. 1 a T-type three-piece [756] fitting. If we examine the left-hand end of this fitting, we will find a body B, a nut d, a sleeve C, and a tube A. The body B has a conical nose and threads on the outside. The nut d is threaded over the body and has a shoulder which presses the sleeve against the shoulder on the sleeve A, and forces it against the back side of the sleeve C—rather, which forces it against the back side of the flare on the tube A, thus forcing the tube against the conical nose. [757]

(Testimony of Harold W. Adams.)

Q. Refer next to George 326,425, which was not a file wrapper reference.

A. George 325,425 shows a fitting which is intended as a union between two tubes. The body a has a 90-degree face, against which the tube a—against which the sleeve a forces the tube. Apparently some of the sealing is accomplished between the sleeve a and the tube on the left side designated B and some of it appears to be accomplished by the sealing of the tube against the perpendicular face of the body a. There is also an unlettered nut which holds the sleeve against the body.

Q. The next one in order is Potts 406,060, which was not a file wrapper reference.

A. Potts 406,060 shows in Figure 2 or 3 a three-piece fitting with a body c, having a conical end and a tube a flared to fit over this conical end, a sleeve i which in this case is split as shown in Figure 4, and held in place on the back of the flare, or, rather, by pressing on the back of the flare forces the flare onto the nose of the fitting c. This is done by means of the nut f.

Q. Next refer to Anderson 535,236, which also was not a file wrapper reference.

A. Anderson 535,236 shows—referring in this case to Figure 3, the lower figure—shows a body g having a conical nose, which appears to have an insert H. The flared [758] tube J is slipped over the conical nose of the fitting, a sleeve is used to press the tube against the conical nose of the fitting, and that is held in place by the nut L.

(Testimony of Harold W. Adams.)

Q. The next one is Jordan 654,735, not a file wrapper reference.

A. Jordan 654,735 shows in Figure 2—well, I think you would have to call this a four-piece fitting, in that the nose b appears to be a separate piece—no, I remember the description of this fitting. b is in effect a flaring tool which is left in place after it has been used to flare the tube, and the sealing is accomplished by means of the sleeve c pressing the flared tube a against the nose of the fitting which is apparently E. This is done by means of the nut g.

Q. Now, we come to the first in this group of file wrapper references, Dossert 772,136.

A. Dossert 772,136 shows—I don't know whether you call it a three or four-piece fitting, it has a body 2 with a separate nose 5, this is in Figure 1, a tube 7 which is flared and slipped over the separate nose 5, and is held in place by means of the sleeve 11, which is held onto the main body or the right-hand part of the body No. 2, by means of the nut 12 or 15. It seems to bear both numbers.

Q. Now, turn to Reed 964,315.

A. Reed 964,315 shows—well, in the left-hand end it [759] shows—I might mention that the right-hand end appears to be a simple plumber's ground coupling. The left-hand end shows a three-piece fitting in which a body g has a conical nose, the tube 1 is flared and is slipped over this conical nose and is held in place by means of the sleeve g, which is pressed by means of a shoulder against the

(Testimony of Harold W. Adams.)

back side of the flare by the nut 3, which is screwed onto the body g.

Q. Turn next to Brown 1,058,542, not a file wrapper reference.

A. Brown, 1,058,542 shows in the left-hand end of Figure 2 a two-piece fitting similar in general appearance to the Weatherhead inverted flare fitting or the Parker standard fitting. However, this fitting consists of the nut 9 which is screwed into the body 18, the body 18 has a male conical surface down in the bottom of the threaded recess. The tube is held onto this conical surface, the tube 7 is held onto this conical surface by a tapered seat on the inside of the nut 9. In Figure 3 it can be seen that the angle on the male cone differs from the angle on the inside of the device which holds the tube against the fitting.

Q. The next one in order is Bachmann 1,352,342, not a file wrapper reference.

A. Bachmann 1,352,342 shows a three-piece fitting, referring to Figure 4, the lower right-hand figure, it has a body 3 having apparently approximately a conical surface, a [760] tube 8 is flared and is held onto this surface by means of a sleeve 14, which is pressed against the back of the flare by the nut 9, it is screwed onto the body 3.

Q. The next one is Benzion 1,680,080, not a file wrapper reference.

A. Benzion 1,680,080 shows in Figure 4, referring to the left-hand end of the figure, a body C with a nose on which the tube a has been flared and

(Testimony of Harold W. Adams.)

slipped over the nose on the body C and is held in place by a sleeve d, which has a shoulder against which the nut n bears, the nut n is screwed onto the body C to hold the sleeve and flared tube onto the conical nose of the fitting, or the nose of the fitting, it isn't quite conical.

Q. By the way, in examining this patent did you observe any comment in the description of it relative to a clearance between the nut and the sleeve?

A. Well, I would have to look at it again.

Q. Will you glance at it a moment?

A. Let's see.

Mr. Freeman: To save you time, start reading with line 81, column 2.

Mr. Huebner: Thank you, Mr. Freeman.

The Witness: He reads faster than I do.

A. "Furthermore, due to the loose fit of the flanges n, n" [761]

That is what we would call a nut.

"over the sleeves D,D"

which we would call a sleeve.

"and of the nuts N, N over the shoulders or flanges d, d, and the engagement of the inner faces of the flanges n, n with the outer faces of the flanges d, d in planes perpendicular to the axis of the spice-coreduct C, the parts are permitted to adjust themselves and binding is avoided."

Q. (By Mr. Huebner): Now, refer to Hewitt 1,820,020, which is a file wrapper reference. That

(Testimony of Harold W. Adams.)

is the second one of this group noted to be a file wrapper reference.

A. Hewitt, 1,820,020 shows in Figure 1, I guess you would call it a four-piece fitting, it is a three-piece fitting with a separate nose, it has a body 6, a separate nose 8, a tube 10, a sleeve 13, and a nut 17. The nut 17 through the sleeve holds the flare of the tube against the nose on the part 8.

Q. The final one in this booklet is Parker 1,977,241, which was a file wrapper reference. Now, will you give some time to a discussion of what this early Parker patent shows?

A. Parker patent 1,977,241——

Mr. Huebner: Is that in your Honor's book?

The Court: I don't see it. [762]

Mr. Freeman: Both Parker patents are in the book.

Mr. Huebner: We can loan Mr. Beehler's copy to the court.

Mr. Freeman: The court has it. It is No. 18 in the book, your Honor.

The Court: Yes, I have it.

Mr. Huebner: This particular Parker patent has not been before the court until it was offered with the prior art patents.

Q. (By Mr. Huebner): Now, will you discuss that, Mr. Adams?

A. Yes. This patent in Figure 1 shows a three-piece fitting having a body 1, a nut 3, a sleeve 2, and a tube 7. The nut forces through the sleeve the flared tube against the nose of the body 1.

(Testimony of Harold W. Adams.)

From reference to Figure 3 more details of the fitting can be seen. The shoulder through which the nut forces the sleeve axially against the fitting body is formed as a spherical surface becoming the radius r' , the lowest letter on Figure 3. The nut, or, rather, there is a clearance between the sleeve and the nut. The surface 5 of the body and the surface 16 of the sleeve are both spherical radii. A line has been drawn tangent to the ends of the spherical radii, such as to define the conical surface that approximates most nearly this spherical surface. That angle on the sleeve is noted as being 50 degrees; the [763] corresponding angle on the nose of the fitting is noted as being 40 degrees. The head of the fitting is cut out somewhat, and it will also be noted that there is a clearance 17 between the sleeve and the nut. Now, referring to Figure 4, which shows the same fitting with the tube in place, it will be noted—which shows the fitting in the hand tight or untightened position, it will be noted that the sleeve 10 contacts the back of the flare at the tip of the fitting, which is noted as 16 in Figure 4, and that toward the base of the sleeve or where the inner diameter of the sleeve meets the angular surface on the inside of the sleeve there is a clearance, in other words, where the tube flare starts at the root of the flare there is a clearance at the time that the contact is made at the tip of the flare. It will also be noted that the contact between the sleeve and the tube takes place adjacent to the tip of the flare.

(Testimony of Harold W. Adams.)

In Figure 2, the fitting is shown in a slightly misaligned position, and in this case the clearance between the sleeve and the nut has increased on the right-hand side of the fitting and has decreased, apparently, to contact on the left-hand side of the fitting. This is in the region adjacent to the shoulder.

It is a little difficult to tell what the clearance is from the patent. However, it appears that the toe of the sleeve must be out of contact with the nut, since the rotation. [764] the angular rotation or angular misalignment, has been accomplished about the point y, and therefore in the region of the shoulder, since it is farther from the center it would move farther sideways than in the region of the toe of the fitting. [765]

Mr. Huebner: I have some more questions on this patent. Does your Honor want me to pursue them or stop now?

The Court: We will stop now for our afternoon recess, since you have suggested it. We will now recess until 3:15.

(Recess.)

Q. (By Mr. Huebner): We are still talking for a moment, Mr. Adams, about Parker patent 1977241. I believe you referred to the head of the body as being spherical, is that right?

A. Yes.

Q. And the internal countersink or end surface of the body, is that also slightly spherical?

A. Yes, it appears to be.

(Testimony of Harold W. Adams.)

Q. Then the sleeve is brought down into finger tight position upon the end of the flared tube, is it correct to say that the nose or end of the sleeve has initial contact with the outside surface of the flared tube at the end of the flare?

A. It is at the end or very close to the end.

Q. When the sleeve is then wrench tightened, is there a full contact between the inside surface of the sleeve and the outside flared surface of the tube?

A. Yes. That is shown in Fig. 1 and Fig. 2.

Q. As an engineer familiar with hydraulic fittings, what difference, if any, does it make whether you use a [766] spherical head on the body and a corresponding or approximately corresponding physical end on the end, or whether you use a straight coniform flare?

A. I don't believe there would be any appreciable difference in the operation of the fitting. This spherical face might permit slightly more misalignment, the one that is shown in patent 1977241.

Q. Having this Parker patent in front of you, if you, as an engineer, decided that it would be preferable to use one of the coniform flares known to the art, would there be any problem involved in changing this particular configuration to a coniform flare?

A. Oh, no.

Q. Now, what is the purpose of the annular recess on the outside of this sleeve in the Parker patent 1977241?

(Testimony of Harold W. Adams.)

A. It is to provide flexibility so that the toe of the sleeve can expand when the sleeve is tightened down onto the back of the flare.

Q. If one seeing this particular form found that—or even considered that the end of the sleeve might be too flexible, what would the obvious thing be with an engineer to do to make it more rigid?

A. Well, we have this problem all the time and we add material wherever we have to increase the rigidity of a part. [767]

Q. In this case, what would you do, add material to fill up that outside recess? A. Yes, sure.

Q. And if you did that, would you have what some of the other patents or at least one of the other patents refers to as a solid head?

A. Yes.

Q. Would there be any problem involved in turning this cut-away sleeve of the early Parker patent into a solid head of the later Parker patent?

A. No.

Q. Do you think there is enough clearance shown between the outside of the sleeve in the early Parker patent which you are looking at, and the interior of the nut, to provide for any ordinary expansion encountered when this fitting is tightened wrench tight?

A. If the drawing is intended to be to scale, I would think so, with the materials that are commonly used in aircraft, that is, with a soft aluminum tube.

(Testimony of Harold W. Adams.)

Mr. Freeman: Did this last answer apply to Parker 1977241?

Mr. Huebner: That is what we are talking about.

The Witness: Yes.

Mr. Freeman: I want to be sure, because there are several Parker patents, and the one he is looking at may not [768] be very definite a year from now.

Mr. Huebner: Well, let's clear the record on it.

Q. Were you talking about the patent Mr. Freeman identified by number?

A. Yes. I was referring to Parker patent 1,977,-241.

Q. I would like to direct your attention to Exhibit——

The Court: Before you get off of this, are you through with this patent?

Mr. Huebner: For the moment, yes, your Honor.

The Court: I want to ask the witness a question, if I may.

Mr. Huebner: Yes.

The Court: Did you refer to this sleeve in patent 1977241 as a toe contact sleeve?

The Witness: Yes.

The Court: In other words, will you say that the toe comes in contact first with the flare?

The Witness: Yes, I would.

The Court: Looking at Exhibit 4——

The Witness: Fig. 4?

The Court: Fig. 4. You said when it was tightened up wrench tight, that there was no open space

(Testimony of Harold W. Adams.)

between the bottom of the flare and the top of the tube, but on Fig. 4 there seems to be a little white line. Does that indicate open space? [769]

The Witness: Referring to line 47 in the text of the patent?

The Court: Yes.

The Witness: It says:

“Fig. 4 is a detailed section similar to Fig. 3, but showing the parts brought into initial contact and before being fully clamped down.”

I referred to Fig. 1 and Fig. 2 as showing the fitting in the tightened condition where there is no gap in the base of the flare. In other words, the gap which appears in Fig. 4 is only there on initial contact. There is initial toe contact. Then the toe of the flare, the toe of the sleeve expands, or the tube deforms, or something happens so that the entire surface of the sleeve and the entire surface of the back of the flare appear to be brought into contact on tightening, as shown in Figs. 1 and 2.

The Court: Well, now, let me ask you another question. Assuming that you wanted more rigidity and you filled up the cut-out portion of the flare——

The Witness: The sleeve?

The Court: I mean of the sleeve.

The Witness: Yes.

The Court: Would you see any advantage at all, instead of having that a perpendicular sleeve, to have it angled in towards the flare? [770]

The Witness: I think the clearance at the tip of

(Testimony of Harold W. Adams.)

the flare—it is important to have some clearance at that point. I don't see any great advantage to have an angle on the outside of it.

The Court: Well, let's put it this way. Assuming that you would have a solid sleeve——

The Witness: Yes.

The Court: ——would you see any advantage of having a larger space between the toe of the sleeve and the side of the nut at the toe than you would at the top part of the sleeve?

The Witness: This fitting doesn't show a construction that I believe would be very satisfactory—I have to answer it this way—because at the point 13 in Fig. 4, I would expect to find a radius, and normally in parts that we design where we have an internal corner, we put a radius to avoid a stress compensation at this point, and I would expect that any angle outside of a line drawn from the tip of the sleeve to the base of this radius to be simply useless material. So that the advantage of an angle on the outside would depend on the relation between the radius in the nut and the clearance at the tip.

Let's take, for example, some numbers which don't bear any relation to actual fittings, but suppose I want a clearance at the tip of the sleeve of 10/1000ths of an inch. Then [771] suppose I wanted a radius in the nut of 10/1000ths of an inch. Then if I had a parallel sleeve, I would have as much bearing as I could get by putting an angle on the head of the sleeve, because if I put an angle on the

(Testimony of Harold W. Adams.)

head of the sleeve, I would simply have to chamfer it off again in order to clear the radius. [772]

If I wanted to cut the end of the sleeve, the toe of the sleeve, down 50/1000ths, and only wanted a 10/1000ths radius, then there would be an advantage in having an angle on the outside of the head.

I would be glad to draw that on the blackboard if it would clarify the matter. Perhaps my explanation hasn't been sufficiently clear.

The Court: Do you see any advantage in having the top shoulder of the sleeve sloped rather than directly across?

The Witness: No.

The Court: According to Figure 4 it is sloped; does that give you any additional pressure any place?

The Witness: That was intended in this fitting to provide for the misalignment of the sleeve with the nut, provide continuous contact even though there was misalignment. It would give a slight inward force to the sleeve, that is, it would give a hoop compression in the sleeve in the region of the clamping shoulder. I think that this is no particular advantage or disadvantage. I believe that small angles at that point would have no significant effect on the operation of the fitting.

The Court: Excuse me for breaking in.

Q. (By Mr. Huebner): Now, will you refer to two other Parker patents which are already in evidence, No. 1,893,442—

Mr. Freeman: No. 17 in your book, your Honor. [773]

(Testimony of Harold W. Adams.)

Q. (By Mr. Huebner, continuing): ——and to 1,977,240. These were both file wrapper references and are referred to in the patent in suit. Explain to the court, Mr. Adams, what is shown in the first of these two patents?

A. Parker patent 1,893,442 shows a three-piece fitting, referring to Figure 2, having a body 1, a nut 10, a sleeve 11, and a tube 6. The nut acting through the shoulder 15 forces the sleeve against the back of the tube flare, and thus forces the tube flare onto the nose of the fitting.

Q. Does the sleeve in this patent 1,893,442 comprise a solid head? A. Yes.

Q. You do not find, however, in this patent, do you, any reference to a toe contact of the sleeve head with the flared tube?

A. As I remember, I don't find any reference in the written matter. It looks from the picture as though there was, but I think it is probably a draftsman's shading, or something.

Q. Where do you observe that? Which figure?

A. In Figure 2, the very heavy line which marks the division between the outer portion of the tube flare and the inner portion of the sleeve on the angular surface gets wider as it moves away from the toe of the sleeve.

Q. Now, refer to Parker patent 1,977,240, the second [774] in this immediate series, and explain what is shown there.

A. This patent, Parker, 1,977,240 shows a three-piece fitting. Referring to Figure 1 there is a body

(Testimony of Harold W. Adams.)

1, a nut 6, a sleeve 9, and a tube 4. The nut 6 forces the sleeve onto the back of the flare by means of the shoulder 13, it appears to be at a slight angle, and forces the tube onto the nose 2 of the body 1.

Q. Again we have a solid head shown on the sleeve, don't we? A. Yes.

Q. And do we find in this patent a clearance between the outside of the sleeve head and the inside of the nut? A. Yes.

Q. And in that case there would be no need for any particular angling of the outside of the sleeve head, would there?

A. This would depend, as I pointed out before, on the relative clearances.

Q. Well, if you had enough clearance to start with that would accommodate any expansion you wouldn't need an angle on the outside, would you?

A. No.

Q. Would that same observation be true with respect to the Parker patent upon which the court was asking you some questions, 1,977,241, assuming that the space shown [775] between the head of the sleeve and the interior of the nut was sufficient to start with, that any ordinary expansion under use would be accommodated, there would be no need for an angle on the outside of the sleeve head, would there?

A. No. As I pointed out before, this is a function of the radius in the corner of the nut, too.

Q. Directing your attention to Exhibit D and the photostats accompanying the stipulation SS of

(Testimony of Harold W. Adams.)

which I have handed you a separate copy for reference——

Mr. Freeman: The court has that in its book No. 19.

Q. (By Mr. Huebner, continuing): ——will you examine Figure 86 in the Exhibit SS and compare it with the figure shown in Exhibit D and state whether or not they are identical?

A. Well, one appears to be simply an enlargement of the other.

Q. Which is the enlargement?

A. Exhibit D appears to be an enlargement of the figure in Exhibit SS.

Q. And the enlargement has also been colored, has it not? A. That's right.

Q. O. K. Now, do you know what that is, what that illustrates, Figure 86, either from Exhibit D or from Exhibit SS, do you know what it illustrates? [776]

A. Yes, it shows a three-piece tubing fitting.

Q. Will you describe in detail to the court what its parts are and how they are put together?

A. Yes, it shows a body A, a nut C, a sleeve D, and a tube B. The sleeve D is held against the back of the flare on the end of the tube B by means of the nut C. The fitting A has a conical nose against which the tube is pressed. There is a clearance between the sleeve and the nut in the region of the nut head.

Q. Do you happen to know from reading the text of Exhibit SS whether materials are specified for this coupling or fitting?

(Testimony of Harold W. Adams.)

A. As I recall, the text refers to the use of lead pipe.

Q. Lead pipe would be the part indicated by B, wouldn't it? A. Yes.

Q. And it is shown as flared in this Figure 86?

A. That's right.

Q. Would it make any difference in the success of this fitting whether flared lead pipe or tubing, or aluminum tubing, or other types of metal might be employed for the tubing?

A. No, I don't believe it would make any difference. [777]

Q. As an engineer, could you take this showing here and make a fitting which would work?

A. Yes.

Q. Could you make a fitting from this disclosure which would work for aluminum tubing or even steel tubing? A. Yes.

Q. Do you observe any clearance between the outside of the sleeve head and the inside of the nut? A. Yes.

Q. If you take the proportions as they are illustrated in this particular figure 86, would that clearance, in your opinion, be sufficient to prevent a binding of the sleeve head with the nut?

A. Well, there is, of course, no tubing center line shown here so that it is impossible to tell the diameter of this fitting. However, judging by the relative wall thickness that I know to be in use and the size of threads relative to their diameter that I know to be in use, I would judge that there was ample clearance to permit expansion.

(Testimony of Harold W. Adams.)

Q. Now, getting to another subject for a moment, do you have any knowledge as to the reason for adoption of the AN standard in fittings?

A. Do you mean as to the reason why it was made standard instead of the AC811 fitting?

Q. Yes. [778] A. Yes.

Q. Will you tell the court what the reason was?

A. The reason, let us say one of the principal reasons, the one that I am familiar with, for the adoption of the AN standard over the AC811 was that the Navy Department had their vessels and their repair stations equipped with tools for making standard threads. The AC811 fitting used a thread series which was not standard, except in the smaller, the very small sizes, and I think one or two of the large sizes. The Navy never approved the use of the AC811—that is why it was called the Air Corps—never approved the use of the AC811 fitting as an AN standard, because they were not able to make replacement parts in their own stations, and they insisted on having a series of fittings which incorporated standard threads.

Q. Now, referring to your statement that you were the one who suggested, and that in turn the Douglas Company received credit for this 18½ degrees angle on the end of the sleeve head as shown in Exhibit P, do you remember that?

A. Yes.

Q. Did you apply for a patent on that improvement? A. No.

Q. Why not?

(Testimony of Harold W. Adams.)

A. Well, because I thought that any engineer that was [779] confronted with the same problem would arrive at either that or some equally satisfactory solution. I just considered it an ordinary mechanical improvement in the course of their business.

Q. Originally, was that a re-working angle?

A. Yes.

Q. And that later it was adopted as going into originally manufactured parts of certain sizes of materials? A. That's right.

Q. I would like to have you refer to Plaintiff's Exhibit 28-Q. That is one of these illustrative drawings. Now, by that illustration the plaintiff has endeavored to demonstrate that there is some benefit to be obtained from making the outside of the sleeve head with an angle. Will you state to the court what your conclusions would be, whether they coincide with that view of the plaintiff's position, as I have summarized it, or whether you disagree?

A. No. I don't see any advantage in the figure as drawn here, in having an angle on the outside, because if the outer wall of the sleeve were to be carried vertically upward parallel with the inner wall of the nut until it made contact with the nut, and the chamfer was then not used at the corner, we would have the same amount of bearing at the base of the sleeve, and we would have the same amount of clearance at the tip end of the [780] sleeve.

(Testimony of Harold W. Adams.)

I don't see what the angle on the outside does except force you to put a chamfer on the corner.

Q. Well, would the mutual bearing surfaces of the sleeve head and the nut be reduced significantly if you were to eliminate that angle on the outside of the sleeve head?

A. Well, in the first place, this drawing is not to scale and it is a little difficult for me to know. In the actual fitting on which I have made calculations, on the size 8 fitting——

Q. AN fitting?

A. Yes, size 8, AN fitting. I happen to have made calculations, and in that case, with the chamfer reduced from 10 thousandths to about 6/1000ths chamfer, which is perfectly practicable, the width of contact between the sleeve and the nut would be the same, even though there were no sleeve head angle.

So that if the sleeve head angle was eliminated, the clearance was kept the same, and the cylindrical surfaces on the outside of the sleeve and the inside of the nut were parallel, the contact area between the nut and the sleeve would still remain the same, if the chamfer were reduced from 10/1000ths chamfer to a 6/1000ths chamfer.

Q. If you made the sleeve head with a cylindrical exterior spaced from the cylindrical interior of the nut of sufficient width, you wouldn't even need the chamfer, would [781] you? A. I am sorry?

Q. Look at Exhibit 28-Q. A. Yes.

Q. If you carried that broken line straight up to the upper surface of the sleeve head and made

(Testimony of Harold W. Adams.)

that broken line the exterior surface of the sleeve head, you wouldn't even need the chamfer, would you? A. That's right.

Q. Now, on another subject for a moment——

The Court: May I ask a question?

Mr. Huebner: Yes.

The Court: I understood that one of the reasons why the sleeve head was larger at the top, or why it approached closer to the side wall of the nut was to have an area of less expansion as compared to the toe of the sleeve head when you had unlimited expansion. Do you see any advantage in having restricted expansion?

The Witness: When you say restricted expansion, you mean that the nut—I mean, that the sleeve would expand out against the nut and thereby restrict expansion?

The Court: My understanding was it was desirable to have restricted expansion at the top of the sleeve head.

The Witness: No. I think there is no advantage whatsoever in that. They actually don't expand now and they [782] don't touch the nut now, and they don't expand appreciably now, so that there is no particular restriction there now, as far as I have been able to determine from tests.

Q. (By Mr. Huebner): When you say "now," you are talking about the actual AN fittings in use?

A. Yes, that's right.

Q. And now about the Parker patent in suit?

A. Yes. I am talking about an actual AN

(Testimony of Harold W. Adams.)

fitting. In the actual AN fitting, they don't expand at that point appreciably.

The Court: Let me ask you another question. If there was no reason or no beneficial results obtained by having the outside of the sleeve head inclined, why was that required on certain types of installations?

The Witness: I can only venture an opinion. I don't know.

The Court: You are an expert.

The Witness: Well, I wouldn't say it was required. I would say it was probably in there, introduced in there in view of patent considerations.

The Court: Isn't it a fact that a lot of your specifications require the head of the sleeve to be inclined?

The Witness: Yes, sir. The AN fitting has an inclined head on the outside.

The Court: And that is required? [783]

The Witness: Yes, sir, in the specifications.

The Court: Now, if that is required, why is it required, if there is no beneficial use derived?

The Witness: Well, I suspect it was the long arm of the Parker Company that got that put in the specification, but that, as I say, is only an opinion.

The Court: Of course, opposing counsel don't agree.

The Witness: I am sure of that.

Mr. Freeman: Not even with the volunteered statement of the witness.

(Testimony of Harold W. Adams.)

Mr. Huebner: You don't need to get mad about it.

Mr. Freeman: No, no, I just called it a voluntary statement of the witness. If I was mad, I would have objected to it.

The Court: You may proceed.

Q. (By Mr. Huebner): Now, going to another subject for a moment, concerning assembly and re-use of fittings, are you familiar with the DC-3?

A. Yes, sir. You mean the Douglas DC-3 airplane?

Q. Yes. That is what I wanted to ask you, what it was or is. A. It still is.

Q. Have you any knowledge—well, let's go back for a minute. What kind of fittings did the early DC-3s have in them? [784]

A. The Parker standard fitting.

Q. What was that?

A. That is a two-piece fitting in which the male nose over which the flare is slipped is at the bottom of a threaded depression, and the nut has threads on the outside and a flare on the inside, and it is screwed down into this recess to hold the flare against the nose of the seat. [785]

Q. Did that fitting have an AC number?

A. I think it was given a number AC 810.

Q. And in that AC 810, two-piece fitting, the nut rotated on the flare of the sleeve, didn't it?

A. On the flare of the tube, on the back of the flare of the tube. There was no sleeve.

Q. That is what I mean.

(Testimony of Harold W. Adams.)

A. That's right.

Q. Did those have to be taken apart and put together again over and over during repair and overhaul?

A. Oh, yes.

Q. Do you know of any DC-3's with those fittings in them that have been overhauled, and if so, how many hours those ships have flown?

A. I examined not very long ago five airplanes which American Air Lines had retired from service. These airplanes still contained AC 810 fittings, and I don't know the exact log hours on the airplanes, but some of them had in the neighborhood of twenty-five to thirty thousand hours, as I remember.

Q. When were those built, around 1935?

A. They were pretty early airplanes. Yes, about '35 or '36, around in there.

Q. Did those planes have a good safety record?

A. Oh, yes. I don't think anybody will dispute the [786] safety record of the Douglas DC-3.

Q. Those planes had had periodic overhauls through the years?

A. Yes, sir.

Q. And in those overhauls these AC 810 fittings were disassembled and reassembled again?

A. Yes, sir.

Q. Do you have any personal knowledge of the current policy of the aircraft industry with respect to whether the AN standard should be continued or whether another type of fitting should be employed?

Mr. Freeman: I am going to object to that as absolutely immaterial, as to what somebody may

(Testimony of Harold W. Adams.)

do in the future. I think we are trying this law suit on fittings here involved, and not what may happen next week or next year.

I let a little of it go in with Mr. Bumb, when Mr. Bumb was testifying, but I think that just takes time.

The Court: Sustained.

Mr. Huebner: May I make an offer of proof, your Honor, in that connection.

The Court: Yes.

Mr. Huebner: That I expect to show by this witness, in corroboration of what Mr. Bumb testified to, that it is the predominating policy of the aircraft industry to do away with the AN standard fittings, and to go to a flareless tube [787] type of fitting.

I make that as an offer of proof.

The Court: As I see that, this evidence could only be material under one theory. The plaintiff has raised the issue that these fittings were universally accepted, and because they were universally accepted that demonstrated the fact that they were of value, that there was a demand for them. Now, this witness and another witness has testified somewhat to the contrary. It is possible that that will be material to throw light on this question of universal acceptance.

Mr. Huebner: That is right, that is the only purpose of it, your Honor.

The Court: If that is your purpose, I will change my ruling and allow you to produce it only for the

(Testimony of Harold W. Adams.)

use, to oppose the contention as made by the plaintiff.

Mr. Freeman: Of course, when we talk about what somebody is going to do next week or next year, we are then delving into something that is speculative. We are dealing here with facts as they exist as of this moment.

Mr. Huebner: Well, if they have had committee meetings and have set about to change now, that is present information.

The Court: If the witness knows, he can answer.

The Witness: Yes, sir. I, as a former chairman of SAE Committee A-6, Committee for the Standardization of [788] Aircraft Hydraulic Equipment, receive copies of the minutes of their meetings, and I have noted in the past four minutes, that is, over the past two years, comments on the part of the industry that there was a preference for the use of flareless or Ermeto fittings.

The Court: Now may I ask you a question?

The Witness: Yes.

The Court: Isn't it true that all airplane companies are continually experimenting and designing for the purpose of improving the things that they use in their airplanes?

The Witness: Yes, sir.

The Court: And would you say the fact that there is a tendency to get away from an established fitting is an indication that they are working on theories, either theories or actual practice, to try to demonstrate that a new fitting is more preferable?

(Testimony of Harold W. Adams.)

The Witness: We make experiments on many types of new fittings and parts in trying to improve airplanes. When we find one that appears enough better than the previous article, than the article currently in use, when it is enough better to justify the disturbance to our manufacturing that is caused by the introduction of a new part, we then try to get this adopted as a standard and try to change over to its use, if it is sufficiently better to justify a manufacturing disturbance. [789]

The Court: You wouldn't say that the procedure followed in regard to the fitting is any different than the procedure followed in other parts of the airplane?

The Witness: No, that's right.

The Court: There is always an attempt to better the product that is in use?

The Witness: That is correct. I also have observed in these minutes, comments to the effect that this changeover is desired because of troubles with the existing AN fitting. One of those comments was made by the representative of the Grumman Aircraft Company, in which he wished the standardization of the Ermeto fittings——

Mr. Freeman: I object to that as clearly secondary evidence. If he wants to produce what the documents show, that is another thing.

The Court: I think the objection is good. It will be sustained.

Inasmuch as we have come to the place of the objection and the sustaining of it, and we are going

(Testimony of Harold W. Adams.)

to have to start upon a new track. I think we should take an extended recess. I am going to continue this case until July 5th at 10:00 o'clock in the morning.

I have another case scheduled on July 5th. I wish you would come in here on July 5th and give me some indication of how much more time you are going to have to require, if you [790] cannot give it to me now.

Mr. Huebner: I can give you an indication, your Honor. I think we will require not over one more hour of this witness, and some brief questions of Mr. Wagner and Mr. Wolfram. I think. As far as we are concerned they will not be on the stand more than ten minutes between them. That will be our case. What the cross-examination and what the rebuttal is, I don't know.

Mr. Freeman: The rebuttal is going to depend a little on how much Mr. Adams here talks for the next hour, I mean as to what he says. But I think, your Honor, that we certainly ought to be able to finish, if they will not go longer than July 5th noon, we ought to be finished by the middle of the following afternoon. That is saying a great deal.

The Court: That will be Wednesday, then?

Mr. Freeman: Wednesday is July 5th. We had better make it Thursday.

The Court: I would hate to continue this case over to September, and if we don't get it finished promptly that week, it may have to go over to September.

Mr. Freeman: I want to express the apprecia-

(Testimony of Harold W. Adams.)

tion of the Parker Appliance Company in setting it over to July 5th to try to complete it, and we are going to try to do it.

The Court: I took into consideration, Mr. Freeman, your [791] statement about an extended vacation around here, and that is in the record now, so you may have to explain to your client the extended vacation.

Mr. Freeman: I will say that is on court order.

The Court: We will recess now to 10:00 o'clock July 5th.

(Whereupon at 4:00 o'clock p.m. Friday, June 23, 1950, an adjournment was taken to Wednesday, July 5, 1950, at 10:00 o'clock [792] a.m.)

July 5, 1950, 10:00 A.M.

The Clerk: Parker Appliance Company vs. Masters and Collins, further trial.

Mr. Huebner: Mr. Adams.

HAROLD W. ADAMS

the witness on the stand at the time of adjournment, being heretofore duly sworn, resumed the stand and testified further as follows:

Direct Examination

(Continued)

By Mr. Huebner:

Q. Mr. Adams, on page 766 of the record, I asked a question, which is recorded as follows:

(Testimony of Harold W. Adams.)

“Q. And the internal countersink or end surface of the body, is that also slightly spherical?”

I was talking about Parker Patent 1,977,241. My reference to the body was erroneous. My question should read, and I now ask it of you:

And the internal countersink or end surface of the sleeve, is that also slightly spherical?

A. Yes.

Q. On page 766 and 767 of the record, there appears to be a further error in a question. The question read originally:

“Q. As an engineer familiar with hydraulic fittings, [795] what difference, if any, does it make whether you use a spherical head on the body and a corresponding or approximately corresponding physical end on the end, or whether you use a straight coniform flare?”

That question had errors in it and I want to re-ask it.

As an engineer familiar with hydraulic fittings, what difference, if any, does it make whether you use a spherical head on the body and a corresponding or approximately corresponding spherical end on the sleeve, or whether you use a straight coniform flare?

A. I don't think it would make any difference in the performance of the fitting.

Q. Now, on page 771 of the record, the court asked you this question, beginning at line 5:

“Well, let's put it this way. Assuming that you would have a solid sleeve——

(Testimony of Harold W. Adams.)

“The Witness: Yes.

“The Court: —would you see any advantage of having a larger space between the toe of the sleeve and the side of the nut at the toe than you would at the top part of the sleeve?”

Now, your answer was fairly lengthy and I don't want to take up the time of the court to re-read it, but I would like you to re-answer that question at this time, if you will.

Mr. Freeman: What are you doing now? [796]

Mr. Huebner: I am making some corrections that were either inadvertent statements of myself or the witness or incorrect reporting.

Mr. Freeman: Then I suggest you ask him to make any further statement or make the correction he wants to make in that answer.

The Witness: I could clarify the answer for the benefit of those who don't wish to follow the detailed dimensions that I quoted in the record by saying that in the case of the proportions that are used in the common tube fittings of this type, such as the AN fitting, that there is no advantage to that sleeve head angle.

Q. (By Mr. Huebner): Now, I direct your attention to a new drawing which has been hung on the blackboard, and photostats of which I have handed to court and counsel as a matter of convenience. The photostats are reduced one-half, I believe.

(Testimony of Harold W. Adams.)

The Clerk: Shall we mark this, Mr. Huebner?

Mr. Huebner: I am going to ask him a question and then mark it.

Q. What is that original drawing that is hanging on the blackboard?

A. That is a section through a sleeve head and tube flare of a -4 size AN fitting showing the aluminum bronze sleeve just out of contact with an AND 10061 flare. [797]

Mr. Huebner: I offer that drawing in evidence referred to by the witness in the last answer.

The Court: It may be received.

The Clerk: VV.

(The drawing referred to was received in evidence and marked as Defendants' Exhibit VV.)

Mr. Freeman: You are offering the chart and not the small photostat which you gave us?

Mr. Huebner: That is correct. The photostats are merely for convenient reference. [798]

Q. (By Mr. Huebner): With respect to the double angle illustrated there, will you explain what the drawing shows?

A. The drawing shows an aluminum bronze sleeve, having a double angle on the inside. The one nearest the right-hand end of the chart is at a 33-degree angle. The angle adjacent to it is at an 18½-degree angle. The 33-degree angle has a length of 25/1000ths of an inch. The distance from the inner end of that 33-degree angular surface to the beginning of a radius on a sleeve which was not cut away

(Testimony of Harold W. Adams.)

to the $18\frac{1}{2}$ -degree, that is, to the beginning of a radius on a steel sleeve, that distance is 23/1000ths of an inch. The overall length of contact on a steel sleeve not cut away to $18\frac{1}{2}$ -degrees is 48/1000ths of an inch. The toe base or the outer end base and middle of the flare are also noted on the drawing. It will be noted that the 25/1000ths long, 33-degree surface, has its center of contact nearer the base of the flare than the end of the flare.

Q. And is that 25/1000ths area of contact surface in the sleeve parallel or at the same angle to the external surface of the flare of the tube?

A. Yes, it is.

Q. Were you familiar with hydraulic fittings used in airplanes prior to 1941 when the sleeve head angle was added? A. Yes.

Q. Were you familiar with them just as [799] originally installed or after they had been in service?

A. Well, both; we installed them at the Douglas Company, and we overhauled airplanes.

Q. You had some field trips where you made observations concerning that? A. Yes.

Q. Was there any problem observed concerning the sleeve sticking in the nut?

A. Not that I became acquainted with.

Q. I thought perhaps there might have been some occasions when you observed the sticking of the sleeve in the nut. If not, we will pass on to something else.

A. Well, if there were, they were so few that

(Testimony of Harold W. Adams.)

they made no impression on me at the time. I don't remember it as a problem.

Q. Have you had any experience in connection with cracked sleeves of the three-piece type fittings?

A. Yes.

Q. Do you have any knowledge of the Douglas Airplane Company policy with respect to cracked sleeves?

A. Yes.

Q. Will you state to the court what that is?

A. Well, I saw a letter which the Douglas Aircraft Company wrote to United Airplane——

Mr. Freeman: I object to that clearly as hearsay testimony. [800] If he wants to produce the letter, that is another story. But he is now testifying as to what is in a written document. It is secondary evidence at best.

The Court: Sustained.

Q. (By Mr. Huebner): Don't refer to the letter or base it on hearsay. Do you have any personal knowledge of what is the policy of the Douglas Aircraft Company with respect to cracked sleeves which are found in Douglas airplanes in use?

A. Yes, I do.

Q. What is that policy, if you know?

A. Yes. It is our policy to permit operators to continue to operate airplanes having cracked sleeves, provided that the fitting is not leaking after tightening.

Q. If a sleeve is cracked is there present, any longer, any hoop tension?

A. Not in the sleeve.

The Court: May I ask a question? How can you

(Testimony of Harold W. Adams.)

determine that the sleeve is cracked after it is once in the fitting?

The Witness: The crack extends out from the head out to the tail of the sleeve, which protrudes out from the nut.

The Court: And you can see the crack?

The Witness: Yes, you can see the crack. It separates a definite amount. Usually, your Honor, at the time the sleeve cracks a slight leak or drip develops, and it is [801] necessary to tighten the fitting slightly, which then in most cases stops the leak.

The Court: You never put in a cracked sleeve?

The Witness: No, sir, we do not deliver airplanes with cracked sleeves.

Q. (By Mr. Huebner): Will you turn to the Parker patent in suit, please?

A. I don't have a copy of that here, Mr. Huebner.

Q. You have read the three claims of this patent? A. Yes.

Q. And heard the testimony of Mr. Wolfram concerning those claims?

A. I heard some of it, at least.

Q. Well, all right. Whether you did or not I will go on with these questions: Take claim 1 in particular to start with, what is there described, if anything, in that claim which is not found in the prior Parker patent No. 1,977,241, which is in the book of prior art patents? [802]

A. Yes, I have that. In Patent 2,212,183, on

(Testimony of Harold W. Adams.)

page 2, in the right-hand column, line 9 says:

“and having a solid head.”

As I interpret this, they mean not having the cut-out shown in the head of the sleeve in the prior patent 1,977,241.

In line 13, the patent 2,212,183 reads:

“and provided with a coniform flare.”

Patent 1,977,241 had a spherical flare.

Q. Those are the only two differences that you observe?

A. I haven't finished reading it yet.

Q. All right.

A. Those are the only differences in claim 1.

Q. Do you find in any of the other prior patents a solid head, as you interpret Mr. Parker to mean when he defines a solid head in claim 1 of patent 2,212,183?

A. Yes.

Q. Is a solid head, for example, observed in 1,977,240?

A. I don't have that here. Yes.

Q. Is a solid head also present in Parker patent 1,893,442?

A. Yes.

Q. Do you find both of these two prior patents illustrating the head as being provided with a coniform flare?

A. Yes, both patents 1,893,442 and 1,977,240 have [803] sleeves and bodies having coniform flares.

Q. Do you see any problem involved in transposing the solid head of these prior patents and the coniform flare of the prior patents into the Parker patent 1,977,241?

A. No.

Q. Now, let's refer to claim 2 of patent No. 2,-

(Testimony of Harold W. Adams.)

212,183. How does this claim differ from the subject matter of claim 1?

A. The principal difference appears to lie in the statement starting on line 37 of column 2 on page 2, where patent 2,212,183 says:

“the outer surface of the head and said inner wall of the coupling are so dimensioned that the head will contact with the nut in the region of the clamping shoulder, while the remaining portion of the head is free from contact with the coupling member,”

That appears to be the principal difference.

Q. Other than that phrase which you have read, do you find the subject matter of that claim to be disclosed in one of the prior patents in evidence?

A. Yes.

Q. Do you find it, for example, in 1,977,240 or 1,893,442?

A. It is difficult to tell from -442 whether there is [804] room for radial expansion. In -240, there is definitely room for radial expansion, yes. Everything appears to be in 1,977,240 except for this contacting in the region of the clamping shoulder.

Q. What comparison will you make between the early Parker patent 1,977,241 and the subject matter of claim 2 of the patent in suit?

A. Patent 1,977,241 appears to show a tube fitting essentially the same as the one shown in claim 2 of the patent in suit, except that the clearance in the region of the clamping shoulder is sufficiently

(Testimony of Harold W. Adams.)

great so that it probably would not contact in that region.

Q. In 1,977,241, does Fig. 1 show the parts in wrench tight condition?

A. Fig. 1 shows them in the—yes. [805]

Q. Now, in that Figure 1 of that patent, is there illustrated a clearance all the way around the sleeve, that is to say, between the sleeve and the inside of the nut?

A. Yes.

Q. Refer next, if you will, to claim 3 of the patent in suit.

A. Yes.

Q. To short-cut it, I will suggest that that combines approximately features of claims 1 and 2, does it not?

A. Yes, that's right.

Q. What is there about claim 3, then, that is not found specifically in one of these prior patents?

A. Well, the coniform flare or the solid head referred to in line 55 is found in the prior patents, the coniform flare is found in the prior patents; initial contact at the free end of the head is found in prior patents; the outer surface, being an inner wall, "being so shaped relative to each other that when the sleeve head expands the portion of said head contacting with the flared end of the tube is at all times out of contact with the coupling member," that isn't actually a combination of claims 1 and 2.

Q. Claim 3 does not require that the sleeve head contact with the nut in the shoulder region of the sleeve head, does it?

A. That's right. [806]

Q. And in that respect do you find the feature as it is defined in claim 3 to be present in Parker patent 1,977,241?

A. Yes. Also in -240.

(Testimony of Harold W. Adams.)

Q. When you say "240," you are using the last three numerals of the patent, is that right?

A. Yes, 1,977,240.

Q. When you said "240" you were referring to that patent by the last three numbers?

A. Yes.

Q. Among the prior art patents which have been offered in evidence, that is, the prior art patents or the publication, which is in evidence, will you select the ones that you think are probably closer for the purpose of special consideration?

A. Well, I believe that the publication which was offered in evidence. I don't remember the number.

Q. You are talking about the book called Pipes and Tubes, the 1902 publication?

A. Yes, that's right.

Q. Exhibit SS?

A. Exhibit SS. And I believe of the early patents Guyer No. 196,085, McConnell 290,446, Ben-zion 1,680,080, and Parker 1,977,241 show similar fittings.

Q. Are you familiar with the Douglas Aircraft practice [807] with respect to ordering and purchasing fittings or fitting parts?

A. Well, we buy parts separately.

Q. Does Douglas Aircraft ever order from any of the suppliers fittings as assemblies?

A. Not to the best of my knowledge.

(Testimony of Harold W. Adams.)

Q. When these parts get to the plant, what is done with them?

A. They are stocked in stock bins.

Q. And when the parts are used, is there any practice with respect to selecting parts made by any particular manufacturer?

A. No; we just take sleeves out of one bin, nuts out of another, and so on.

Q. Have you made any tests in connection with preparation of your testimony here using flared head tubes with fittings, three-piece fittings?

A. Yes, sir.

Q. Have you any physical examples with you illustrating those tests?

A. Well, they are here, I believe.

Q. Will you step down from the stand and select them, please?

(Witness leaves stand.)

A. Shall I take them with me to the [808] stand?

Q. Yes, take them with you to the stand. Now, before proceeding with a discussion of the physical specimens you have selected, I want to call your attention to Plaintiff's Exhibit 28-D, which is an illustrated drawing entitled "Typical Fitting for Lead Pipe."

A. Yes.

Q. Do you understand what the plaintiff is attempting to illustrate in that Exhibit 28-D?

A. Yes. [809]

Q. In actual practice, is it necessary that the

(Testimony of Harold W. Adams.)

lead be pushed out into engagement with the internal threads on the nut, as shown there?

A. Not in order to produce a satisfactory sealing fitting, no.

Q. Have you made a physical specimen which illustrates that that is not so? A. Yes.

Q. Identify it, if you will, please, and I will offer it in evidence.

A. I have three samples which illustrate that, I think.

Q. Let's take them one at a time. Give them some descriptive identification.

A. All right. The sample of half-inch tubing, with a plug fitting on one end and a threaded fitting on the other end, identified as Adams sample No. 4, was tightened to 30 pounds inches torque——

Q. Just a minute before you go on with that and let me offer that in evidence so that we can specifically refer to it.

Mr. Huebner: I offer that in evidence.

The Court: It may be received.

The Clerk: WW. [810]

(The article referred to was received in evidence and marked Defendants' Exhibit WW.)

Q. (By Mr. Huebner): Now, continue with your description and explanation of Exhibit WW.

A. Exhibit WW consists of a tube which was flared at both ends.

Q. Hold it up so the court can see it, if you will.

(Testimony of Harold W. Adams.)

A. Yes. —which was flared at both ends. It was then tightened until by appearance of the surfaces, it appears that it would probably seal. It was then tested— This required a torque of 30 pounds inches, wrench torque. It was then put on a hydraulic test stand and tightened until it burst. It burst at 1800 pounds per square inch pressure.

Q. And does that burst show in the tube?

A. Yes, down near the threaded fitting end.

Q. What kind of fittings or fitting parts are on the ends of the tube?

A. They are No. 8 fittings, sleeves, nuts, and bodies, the AN-8 size. The nuts are Parker manufacture, I believe—yes. The body seems to be Masters manufacture, the threaded body. I can't make out the other body. The identification on the sleeve isn't visible, so I don't know the manufacturer of the sleeve.

Q. Did you disassemble the exhibit after the bursting test to examine the condition of the flare and the interior [811] threads of the nut?

A. No. This one has not been disassembled.

Q. It is still in its original tight condition?

A. Yes.

Q. Now, will you take your next sample and identify it by sample number and I will offer it in evidence.

The Court: Before he goes on, can I ask a question?

The Witness: Yes.

(Testimony of Harold W. Adams.)

The Court: I notice that tube burst under the pressure.

The Witness: Yes.

The Court: Does that indicate in any way there was a defect in the sleeve?

The Witness: No. That is customary. The fittings are usually stronger than the tube. In fact, it is our practice usually to use fittings that are stronger than the tube so that the tube does not burst.

The Court: It bursts?

The Witness: Yes. The next sample is identified as Adams sample No. 3.

Mr. Huebner: I will offer in evidence sample No. 3.

The Court: It may be received.

The Clerk: Exhibit XX.

(The article referred to was received and marked Defendants' Exhibit XX.) [812]

Q. (By Mr. Huebner): Now, take this Exhibit XX and tell what the parts are, what was done with them, and what happened.

A. Exhibit XX is a duplicate of the previous exhibit. It was tightened, and this time I tightened it to 30 pounds inches torque. Then I very carefully examined it for leakage while the test pressure was being applied. At 1,000 pounds per square inch, which would be three or four times the working pressure at which a tube of this burst strength would be normally used, at 1,000 pounds per square inch, there was a slight leak at one end. So the fit-

(Testimony of Harold W. Adams.)

ting was then re-tightened to 40 pounds inches torque. The pressure was then increased to 1,500 pounds per square inch, or just below the burst pressure, and it was held for 10 minutes. During this time no leakage appeared. I carefully observed the assembly during the test.

Q. Have you disassembled those parts since the test?

A. No. This is in its originally tightened position.

Q. Now, take up your next sample.

A. The next sample is Adams sample No. 6.

Mr. Huebner: I will offer this in evidence.

The Court: It may be received.

The Clerk: YY.

(The article referred to was received in evidence and marked Defendants' Exhibit [813] YY.)

Q. (By Mr. Huebner): Now, referring to Exhibit YY, what are the parts, what did you do with them, and what happened?

A. Exhibit YY shows a fitting identical to one end of the previous samples.

Q. By "previous samples," you mean WW?

A. Yes, WW—both XX and WW. This sample consists of a piece of lead tubing, an AN-8 fitting body, AN-8 nut of Parker manufacture, and AN-8 sleeve. I tightened this assembly to 40 pounds inches torque, which is the same torque that was re-

(Testimony of Harold W. Adams.)

quired to hold pressure without leakage on sample XX, and is 33 per cent above the pressure required to burst sample WW. This was tightened to 40 pounds inches with the same torque wrenches that were used to tighten samples WW and XX.

This fitting was then locked by means of a screw to prevent its turning and was then machined to show cross-section through the fitting. It can be observed from looking at this cross-section that the lead tube at the torque required to seal is not squeezed out. In fact, it looks just about identical to cross-sections through normally tightened aluminum tubes in aluminum alloy fittings. The torque required to seal is approximately one-fifth of the torque required to seal aluminum alloy fittings, because lead is on the order of one-fifth of the hardness of aluminum alloy tubing [814] that is used in conventional aircraft work.

The sealing torque was arrived at in the same manner it would have been arrived at with aluminum tubing and aluminum alloy fittings.

Q. Do you have one more physical example?

A. Yes.

Q. What is its identification?

A. Sample No. 2, Adams sample No. 2.

Mr. Huebner: I offer that in evidence.

The Court: It may be received.

The Clerk: ZZ.

(The article referred to was received in evidence and marked Defendants' Exhibit ZZ.)

Q. (By Mr. Huebner): Referring to Exhibit

(Testimony of Harold W. Adams.)

ZZ, explain to the court what that is and what it illustrates.

A. Exhibit ZZ is a piece of lead tubing assembled on a -8 body, using -8 sleeve and -8 nut. This was tightened to three times the torque previously determined as being required to seal. This was tightened to 120 pounds inches. It can be observed that when this fitting was tightened to three times its normal torque, the tube is almost squeezed completely in two, and the end of the tube flare has been squeezed out into the threads. This fitting shows an appearance similar to the appearance of aluminum tubes which have been tightened to three or four times their normal [815] torque.

Q. Do these examples that you have referred to illustrate that standard AN fittings are suitable for coupling to flared lead tubes? A. Yes. [816]

Q. In connection with your lead tube experiments, or tests that you have described, did you do anything in connection with aluminum tubing for comparative purposes? A. Yes.

Q. These two samples here, are they ones that you prepared? One is No. 8 and the other is No. 9.

A. I prepared this one (indicating). I think Mr. Masters made up this one (indicating).

Q. Which one did you prepare, by number?

A. I prepared the one marked Sample No. 8.

Mr. Huebner: I will offer in evidence Sample No. 8.

The Clerk: AAA.

The Court: It will be received.

(Testimony of Harold W. Adams.)

(The device referred to was marked Defendants' Exhibit AAA, and was received in evidence.)

Q. (By Mr. Huebner): What is AAA and what does it illustrate in comparison with the lead tube exhibit?

A. Well, Exhibit AAA shows a -8 size aluminum tube, with a -8 body, -8 nut, and -8 sleeve, which has been tightened to the normal torque of 200 pounds inches, which is the normal torque for aluminum tubes. Now, this is squeezed out about the same amount and resembles generally the lead tube sample which was tightened to its normal torque of about 40 pounds inches.

Do you want the other two samples? [817]

Q. If the court doesn't need them for the moment, I will hand them to counsel.

Reference was made a moment ago to Sample No. 9, which I think you said Mr. Masters made. Did you work with or give him directions to do anything in your presence on it?

A. Oh, yes. I told him to——

Q. That is enough for the moment.

Mr. Huebner: I offer in evidence Sample No. 9, and then ask you about it.

The Court: It may be received.

The Clerk: BBB.

(The object referred to was marked Defendants' Exhibit BBB, and was received in evidence.)

Q. (By Mr. Huebner: Now, avoid hearsay that

(Testimony of Harold W. Adams.)

you told him to do this or told him to do that, but explain what he did under your direction so far as you know, what it is and what it illustrates, and I am talking about BBB.

A. He tightened this fitting, Mr. Masters tightened this fitting to 525 pounds inches torque. This is between two and three times the normal torque required——

Q. What is the metal of the tube?

A. This is an aluminum tube with -S body, nut, and sleeve. After tightening to 525 pounds inches this fitting was sectioned. It can be seen from the section that the tube is almost completely squeezed away and that the end of the tube [818] flare has expanded into the threads of the nut in similar fashion to the end of the tube flare on the lead tube which was over-tightened to 120 inch pounds.

Q. In connection with these fitting assemblies when coupled up with flared tubes, and regardless of whether the tube is of lead or aluminum or steel, the length of the flare relative to the proportions or measurements of the sleeve and nut has something to do, hasn't it, with whether the material of the tube is pushed out into the threads?

A. Well, yes, a longer tube would be pushed out into the threads, would fill more of the threads when it was over-tightened.

The Court: Just a minute. You say a longer tube. Do you mean a longer flare?

The Witness: Yes, a longer flare.

Q. (By Mr. Huebner): On these lead tube ex-

(Testimony of Harold W. Adams.)

hibits and the aluminum tube exhibits which you have just testified concerning, was the length of the flare on the respective tubes made in accordance with standard specifications?

A. It was about the minimum length permitted by the specification in both cases.

Q. The patent in suit, 2,212,183, we will go back to that for a moment, in claim 1 talks about initial contact. According to the description of that claim, may the initial contact of the nose and of the sleeve be at any point along [819] the outer surface of the flare, or is it required to be at or near the extreme end of the flare of the tube?

A. In patent 2,212,183, page 2, column 2, beginning with line 14,

“the initial contact of the head with the flared end of the tube is at the free end of the head and adjacent the outer end of the flared end of the tube,”

so it must be very close—I would interpret “adjacent”—very close to the outer end of the flared end of the tube. It is out at the largest diameter of the flared end of the tube.

Q. When you say very close, having reference to the word “adjacent,” how close in measurement must that be?

A. Well, “adjacent” means to me alongside. I don’t know what it would be in inches. I should think it ought to be within the outer 10 per cent or so.

Q. Well, then, if the nose of the sleeve were to

(Testimony of Harold W. Adams.)

have initial contact more than 10 per cent of the distance back from the extreme end of the flare, you would say that was not "adjacent" within the meaning of the patent? A. Yes.

Q. I would like you to take physical Exhibit No. 32. Are you able to tell from a visual inspection of the parts comprising this exhibit whether the sleeve does make initial [820] contact of the sleeve of the toe with the flare on the tube adjacent the outer end of the flare.

A. Yes, I can tell. It obviously doesn't, because about half of the flare is protruding from the sleeve when the sleeve is brought in contact with the flare.

Q. Then you would say that that particular physical specimen does not comply with the teaching of claim 1 of the patent in suit?

A. That's right.

Q. Were you present when Mr. Masters conducted some of the demonstrations on various fittings where he bored holes in from the side through the nut to measure the expansion or lack of expansion of the sleeve?

A. Yes, I was.

Q. In the AN fitting made according to standard specifications and employed with a flared tube made to standard specifications, when the nut is tightened to standard torque requirement to effect sealing, is there ever any contact, as far as the demonstrations that you have observed, between the outside of the sleeve head and the inside of the nut in the region of the shoulder?

(Testimony of Harold W. Adams.)

A. No, I have never observed any contact in that region. And from my measurements and Mr. Masters', I don't see how it is possible for there to be any.

Q. Would you say that a shoulder contact between the [821] outside surface of the sleeve head and the inside surface of the nut would have any advantage?

A. Well, that would depend again, on relative clearances, and so on. Actually it might help to prevent the sleeve cracking that we are having [822] now.

Q. If, however, the proportions and measurements are employed according to standard AN—withdraw that question.

You are familiar with the specifications for the AN fittings in the various sizes, I assume.

A. Yes, sir.

Q. And the metals employed? A. Yes.

Q. When any of these are made according to AN specifications, employing the metals called for, in your opinion is it ever possible that there will be a shoulder contact between the outside of the sleeve head and the inside of the nut in the region of the shoulder?

A. Not under normal tightening.

The Court: May I ask a question? You said you were having some trouble with sleeves cracking, is that right?

The Witness: Yes, sir.

The Court: Do you know what causes a sleeve to crack?

(Testimony of Harold W. Adams.)

The Witness: Yes, sir.

The Court: What?

The Witness: Too much clearance around the toe of the sleeve.

The Court: Around the toe of the sleeve?

The Witness: Yes, because that is where the principal radial load is.

The Court: What do you mean by too much clearance? [823]

The Witness: Well, so much clearance that the sleeve head expands so far that it can't take it any more and finally cracks out here in this region. I will have to describe it. I mean by the toe of the sleeve the right hand of the sleeve in Exhibit VV. If there is too much clearance between the toe of the sleeve and the inside of the nut, then when the fitting is tightened, this can expand too far and it can crack. That is the dimensional reason.

Another reason is that the material may be such that it has a poor elongation, that is, that it won't stretch sufficiently without failing. Brittle like glass. It takes a brittle——

The Court: Is this cracking of the sleeve something new?

The Witness: I think it has been worse in recent years, yes.

The Court: What I am getting at is, did you have the cracking of the sleeve before you used the latest form of the sleeve, that is, before they developed all these angles, toe contact, and so forth and so on?

(Testimony of Harold W. Adams.)

The Witness: I think we may have had a few cases, from what I remember. It is hard to remember back. That is 10 years ago. I believe we may have had a few cases then, but we are having more cases now. That is the best of my memory.

The Court: The problem has been accentuated under the [823a] new forms of sleeve, is that right?

The Witness: That's right. That is definitely true.

The Court: I notice you are looking at the clock. It is 11:00 o'clock. Maybe we'd better take our morning recess. We will now recess until 15 minutes after 11:00.

(Recess.)

Q. (By Mr. Huebner): Mr. Adams, are you familiar with any action by the SAE committee regarding making the angle on the outside of the sleeve head an optional thing? A. Yes.

Q. What is the action?

A. The SAE committee on tube, pipe, hose, and lubrication fittings, on January 11, 1950, approved SAE standard 37 degree tube fittings, which is practically identical to the AN fitting, except that the 1 degree angle on the outside of the sleeve head is optional.

Q. With respect to the physical tests, and visual observations, we have in evidence here a great many cut-away models of assembled parts of tubes. We have others that have been drilled from the outside through the nut. What would you say as to

(Testimony of Harold W. Adams.)

the respective reliability of visual observation of cut-away models as against actual measurements of capped nut models?

A. Well, visual models are all right to get a general idea of what is going on, but if you want to know accurately [823b] what is happening with regard to small clearances, I think the measurement is the only thing.

Mr. Huebner: You may cross-examine.

Cross-Examination

By Mr. Freeman:

Q. When you made your lead pipe flare, did you measure the diameter at the toe of the flare?

A. No.

Q. There is a minimum measurement requirement according to AN specifications?

A. Yes, sir.

Q. And when you told the court you followed the minimum sizes of the flare, did you do that by observation only?

A. The flaring machine has a stop on it. We set the stop down to about the low limit.

Q. I am wondering if you could measure for me the overall diameter of the flare of the exhibit that I am now handing you, which is Defendants' Exhibit YY, and then tell me whether or not that comes within the minimum as provided for in the AN specifications.

A. Well, you will have to give me a copy of the AN specifications, too, then.

(Testimony of Harold W. Adams.)

(Mr. Freeman handing document to witness.)

A. It seems to be just about $5/8$. This is diameter [823c] for half-inch tubing, minus 10. That would be $6-4/6$,—I would say this is about 20 thousandths under the minimum.

Q. That measurement that you just made was after you applied the necessary torque to bring about sealing contact; correct? A. Yes.

Q. And it is true that the lead will flow out or that the size of the flare, that is, the diameter at the toe, will increase somewhat due to the torque pressure applied in bringing about sealing contact; correct? A. I am not sure of that.

Q. Haven't you observed, as a matter of fact, that when you tighten up a fitting, that there is some expansion of the flare itself at the toe end?

A. When you overtighten it, yes, certainly. This is not overtightened, however.

Q. Would you say that there is no expansion whatsoever of the flare itself under normal torque?

A. I would say I have never measured that.

Q. And you don't know? A. That's right.

Q. Now, it is a fact, is it not, that lead will flow? A. Yes.

Q. And it is a fact that it will flow more freely than, say, aluminum tubing, under the same torque or pressure? [823d]

A. Under the same torque, yes, certainly.

Q. So that are you willing to say here that there has been no flow of the lead pipe in the fitting that

(Testimony of Harold W. Adams.)

you have here produced as illustrative of what would happen with a lead pipe and a fitting of the -8 size?

A. No, I wouldn't say that there has been no flow. I think there definitely has to be some to seal, just as there is on aluminum tubing. [823e]

Q. So that when you told us a minute ago that the measurements that you have now made was 20/1000ths of an inch less than normal, it is fair to assume, when you started with the flare on the lead pipe that you have in your hand, that the amount was even greater than 20/1000ths below minimum?

A. I wouldn't say that for sure, because it might—you never know whether the thing bent in or something. I wonder if we have any around that aren't tightened, or something of that sort.

Q. I am talking about the one you introduced here as an exhibit.

A. It was probably pretty close to this.

Q. We are both agreed that even under the torque pressure necessary to bring about sealing contact it was at least 20/1000ths less than a normal flare.

A. I think that is probably safe to say, yes. The reason for that is that the stop doesn't stop on the diameter, the stop stops on the length, and this is a little thicker walled tube than would normally be used in aircraft, so when the stop is set for the length it cuts the diameter a little on a thick walled tube.

(Testimony of Harold W. Adams.)

Q. And isn't it also true that the outside diameter of the lead tube that you have there actually filled up the sleeve or the tubular portion of the sleeve itself and is in frictional engagement therewith? [824]

A. No; the sleeve slipped on freely. The lead tube had a ridge down one side, which I had to scrape away, in the region of the sleeve, and the sleeve did slip on freely.

Q. And is the sleeve in contact with the lead pipe at the present moment?

A. Well, of course it is in the region of the flare.

Q. I am talking about that portion that extends up beyond the nut.

A. Well, in the region of the head here it is not in contact. In the region of the sleeve in the parallel portion of the sleeve head it is not in contact.

Q. Now, turning to your Exhibit VV, which is on the blackboard here, what portion of that illustration do you refer to as the flare?

A. The flare of the tube?

Q. Yes. A. The yellow portion.

Q. The yellow portion includes, likewise, the tube proper, does it not?

A. Yes. The yellow portion to the right—well, I would say to the right of the center of the radius about which the bend takes place.

Q. You have a line with the words "base of

(Testimony of Harold W. Adams.)

flare" extending across the tube portion, is that correct? A. Yes. [825]

Q. Now, is there any portion of the flare to the left of that line as you look at the drawing?

A. Well, I had in my own thinking divided it up into three parts; the straight tube, the radius, and the flare.

Q. All right.

A. That line "base of flare" is drawn through the center of the radius.

Q. Isn't it, as a matter of fact, that it is drawn to exclude the curved portion—— A. Yes.

Q. ——between the tube and what you have called the flare? A. Yes, that's right.

Q. What do you call that curved portion? Is that part of the flare, part of the tube portion, or what is it?

A. Well, I call it a transition area.

Q. And you excluded that transition area when you provided the measurements of the flare and obtained the term "middle of flare"; correct?

A. Yes, sir, correct.

Q. And by doing it the way you did you had one portion of the flare 23/1000ths of an inch, and the portion in contact with the sleeve 25/1000ths of an inch; correct?

A. Well, the 23/1000ths was actually measured on the cut-away sleeve. However, it would apply to the flare, too, [826] yes.

Q. When you say "measured on the cut-away of

(Testimony of Harold W. Adams.)

the sleeve," the measurement of 23/1000ths actually extends from the "base of flare" line?

A. Yes, that comes at the same place as the cut-away on the sleeve.

Q. Then, I take it that you do not take into account at all that transition portion, that is, between the tube and the flare, in any of your calculations that you have here given us?

A. That's right.

Q. And might the calculations be different if you included that portion of the flare as part of the flare proper? A. Yes.

Q. Now, I take it that you made no measurements of the outside diameter of the flare of the tube of Exhibit ZZ prior to making your test?

A. This was made with the same stop setting as were all of the lead tube samples.

Q. So if the other one that we referred to specifically, Defendants' Exhibit YY, fell 20/1000ths below minimum, then it is fair to assume that these, likewise, fell short? A. That's right.

Q. How about Exhibit WW and XX? The same applies? [827]

A. They were all made with the same setting.

Q. How about Defendants' Exhibit AAA, which is an aluminum tube within the fitting, was that made on the same instrument?

A. Yes, that was made on the same tube flaring machine.

Q. Do you ever check the overall diameter of

(Testimony of Harold W. Adams.)

the flares after the tubes have been flared to determine their accuracy for proper use?

A. Not normally. We set the stop length to govern the length of the flare on the machine.

Q. Are those stops occasionally inspected and checked for accuracy?

A. At the Douglas Company they are, yes.

Q. Do you provide gauges of the go and no-go kind? A. Not to the best of my knowledge.

Q. Well, what kind of inspection do you give the instrumentality by which you make flares on tubes?

A. Normally we make a few samples on a machine with a certain machine fitting, and then we check it to 10061, and then we go ahead and make flare tubes on that machine with that machine setting. [828]

Q. And the 10061, that is the dimensional drawing? A. Yes.

Q. Which we have referred to here as an AN drawing? A. That's right.

Q. In the event you are 20 thousandths below minimum, as provided for on that drawing, what do you do about that?

A. I expect we would re-set it at 20 thousandths below.

Q. In other words, it is not the practice of the Douglas Company to let any more flares be used than absolutely necessary that fall below the minimum; correct? A. Yes.

(Testimony of Harold W. Adams.)

Q. Douglas Company prides itself on precision of manufacture; correct?

A. Well, a 10 thousandths tolerance is a little too close on these flares, but we come pretty close to it.

Q. Well, you don't deliberately start out and take the 10 thousandths tolerance—— A. No.

Q. ——and then knock off another 20 thousandths, do you? A. No.

Q. Now, I am going to ask you which single patent of those that you have here referred to is in your opinion the best anticipation of the Parker patent in suit. And when [829] I say "patent" I also include there the Bjorling publication.

A. I think they might differ for different claims of the patent in suit.

Q. Well, you give me then the one you think is the best single reference for claim 1.

A. I think probably Parker patent 1,977,241 is closest to claim 1 of the patent in suit.

Q. Now, move over to claim 2 and do the same.

A. Might I have the publication you refer to, a copy of it?

Mr. Freeman: It is your exhibit. Will you give him the Bjorling?

(Mr. Huebner complying.)

The Witness: I think probably Parker 1,977,240 is closer to claim 2 of the patent in suit than the others.

(Testimony of Harold W. Adams.)

Q. (By Mr. Freeman): You consider it the best reference?

A. Yes, the best single reference.

Q. Then take the best single reference or give us the best single reference for claim 3.

A. The best single reference for claim 3, I believe, would be Parker 1,977,241.

Q. In other words, as you have answered me on cross-examination, the two Parker patents, 1,977,240 and 1,977,241 are the best anticipatory references of claims 1, 2, 3 of the [830] patent in suit; correct? A. Yes.

Q. How do you rank the Bjorling publication?

A. Well, I would say it is the best anticipation of the tube fittings as they are actually built; that patent 2,212,183 does not actually represent the fittings the way they are built. You asked me for the best anticipation of the patent.

Q. That's right.

A. I think this Bjorling reference is the best reference to the actual tube fittings.

Q. Does the Bjorling reference show an angle on the outside of the sleeve? A. No.

Q. And do the fittings that are used by the Douglas Aircraft Company, which you have here produced as samples in connection with Exhibits WW, XX, YY, and AAA, provide an angle on the outside of the sleeve?

A. Yes, although we don't think it is important.

Q. I just am asking you now as a fact whether

(Testimony of Harold W. Adams.)

Q. Douglas Company prides itself on precision of manufacture; correct?

A. Well, a 10 thousandths tolerance is a little too close on these flares, but we come pretty close to it.

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A. Yes.

Q. How do you rank the Bjorling publication?

A. Well, I would say it is the best anticipation of the tube fittings as they are actually built; that patent 2,212,183 does not actually represent the fittings the way they are built. You asked me for the best anticipation of the patent.

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A. No.

Q. And do the fittings that are used by the Douglas Aircraft Company, which you have here produced as samples in connection with Exhibits WW, XX, YY, and AAA, provide an angle on the outside of the sleeve?

A. Yes, although we don't think it is important.

Q. I just am asking you now as a fact whether

(Testimony of Harold W. Adams.)

or not those exhibits did in fact include the angle on the sleeve. A. Yes.

Q. And it is a fact that the Bjorling publication does not include an angle on the sleeve?

A. That is correct. [831]

Q. And it is a fact that in the Bjorling publication, the drawing there illustrates a sleeve, the outer wall of the head of which is parallel with the inside wall of the nut throughout its entire length; correct? A. Yes, correct.

Q. And in that respect, the Bjorling publication differs from the Parker patent in suit, which does include an angle arrangement there on the outside of the sleeve? A. That is correct.

Q. And in that respect, the fittings that you have here produced, or those here charged to infringe, likewise differ from the Bjorling publication in that they do provide an angle on the sleeve; correct? A. Yes.

Q. And in respect to the Parker patent in suit and the fittings here charged to infringe, both do include an angle on the outside of the sleeve; correct? A. Yes.

Q. And in the fittings here charged to infringe, the upper portion of the sleeve closely adjacent the region of the contact with the nut is in closer relationship to the nut than at the lower end of the sleeve; correct? A. Yes.

Q. And in that respect, the devices here charged to infringe follow the Parker patent and not the Bjorling fitting; [832] correct?

(Testimony of Harold W. Adams.)

A. In that respect, yes.

Q. And in the Bjorling fitting, the portion of the sleeve which engages the flare is rather closely related to the shoulder on the sleeve? There isn't any great distance between the portion that engages the flare and the portion that engages the nut? I mean distancewise?

A. Well, there is a distance, but it is not large in proportion to the rest of the fitting.

Q. And with respect to the length of the sleeve, how much would you say in the Bjorling fitting is the distance between the part that engages the flare and the portion that engages the shoulder of the nut? Just give me that porportionwise.

A. It is about a quarter of the sleeve head length, somewhere in that neighborhood.

Q. So it is fair to assume that if it is one-quarter of the length of the sleeve head, then the part that engages the flare of the tube is about three-quarters in length?

A. That is about right.

Q. Is that the proportion, about three to one?

A. Yes.

Q. Now, you agree with me, or maybe I should say, do you agree with me that if there was any corrugation or roughened surface on the male member or body member of the [833] fitting that engages the inner surface of the flare of the tube, that that would not make a satisfactory sealing connection?

A. It depends on the size of the roughness.

(Testimony of Harold W. Adams.)

They all have a roughness now from machining.

Q. Well, would you provide or would you have a good sealing connection if there was a rib on the body member, that is, the cone-shaped portion of the body member, which was about the size of a normal screw thread, on a No. 8 fitting?

A. No, that would be a little too big.

Q. In other words, it is desirable, is it not, that in fittings of this kind, you get as smooth a surface both upon the body member and upon the inside of the flare as possible in order to make a good seal; correct? A. No, I don't think so.

Q. In other words, you would say——

A. We deliberately turn rings in some fittings, you know, to make them seal.

Q. We are talking about the AN fittings here. Do you know any we turn rings in?

A. No, not on the AN fittings, of course.

Q. In those where you turn rings, those are usually seals that are used for sealing rubber hose?

A. No, sealing metal parts. [834]

Q. Are those the cable type?

A. No. They are usually used—there is, I believe, an AN, at least it is in the AN standard parts book, a fitting where copper is sealed on a surface and there are grooves turned in the surface to provide a higher lock bearing pressure and therefore make it seal better, and these are used on 90 degree flares rather than 30 degree flares, although I don't see any particular difference. [835]

Q. Well, upon the flares of the kind that we

(Testimony of Harold W. Adams.)

have here been considering and the kind of fittings that we have here been considering, it is desirable, is it not, to have as smooth a surface as possible upon the body member that engages the inside of the flare; correct?

A. Well, I have never tried one, I don't know.

Q. As far as you know, there are none of the kind here involved that provide rough surfaces, roughened surfaces?

A. No, I don't know of any of these that have roughened surfaces.

Q. And you do agree with me that the smoother the contacting surfaces the better will be the seal?

A. No, I don't agree.

Q. Well, why don't you agree? I am going to give you all the room you want.

A. Well, because a high local bearing pressure is sometimes advantageous in producing sealing, and we do this, as I say, in other places. We have never happened to do it on this kind of a fitting. But a high local bearing pressure is sometimes advantageous in producing sealing. Particularly with the harder members. The harder the tube the smaller the bearing area you should have in order to be able to seal with a lower torque on the nut. In other words, you can press a small ring into a harder tube with less pressure, less wrench torque, than you can a wide surface. So line [836] contact, you might say, is sometimes an advantage over area contact. Your Exhibit No. 28 something points that out.

Q. Thank you. What you are now saying is

(Testimony of Harold W. Adams.)

when you have a flat surface contact of the kind that we have here, as distinguished from a ring that you want to imbed between the two members or into a member, it is desirable to have the surfaces smooth?

A. You are a little ahead of me on that one. I said as far as the male surface of the body was concerned that I have never tested one with circular rings around it, and I don't know whether it would be an advantage or not, but that I would expect with a steel tube it might even be an advantage. I definitely don't think that it is proven that a smooth surface is better.

Q. Taking these various fittings that you said where you have a ring that you want to have imbedded into the male member, or where the parts co-operate where one imbeds within the other——

A. Yes.

Q. ——are those reusable?

A. Well, the ones that we use, the AN ones, are, yes. Wait a minute. I take that back. The fittings are reusable, but the tubes, or in this case the gasket is not.

Q. In that case you use a gasket member? [837]

A. Yes.

Q. And the gasket member is the sealing member?

A. That's right.

Q. The fittings are reused but the tubes are not reused?

A. The gasket, which would be comparable.

Q. It brings about the sealing?

(Testimony of Harold W. Adams.)

A. Yes. It is not.

Q. The fittings that we are talking about here, it is true that the tube, the body, the nut, and sleeve are all reusable? A. Yes.

Q. Now, speaking of gaskets, did you find any rubber gaskets that served as a sealing means in connection with any of the prior art patents that you described here a week or so ago to the court?

A. Wait a minute, now. I want to clear up something on that last one. The type that we use now with the copper gasket, the gasket isn't reusable. If we had small rings on the nose of the male part, I believe that would be reusable.

Q. I am talking about only those that you are actually using. A. All right.

Q. Those are not reusable? A. No. [838]

Q. And the fittings here involved are reusable?

A. I say they aren't reusable, because it is not our practice to reuse such inexpensive things as gaskets. I see no reason why you couldn't reuse them, as a matter of fact. We just don't.

Q. That last answer of yours is probably predicated upon the same type of reuse of rubber rings that maybe your wife and my wife uses on mason jars; you can reuse the rings we used last year, but it is not very desirable?

A. Well, we throw away the gaskets because they are pretty cheap things.

Q. Do you recall my question wherein I asked you whether or not in the patents that you described to the court, each of which you said con-

(Testimony of Harold W. Adams.)

sisted of a body, sleeve and nut, whether or not there were in fact some rubber gaskets used for bringing about the sealing means?

A. In the patents that I described?

Q. Yes.

A. There might have been one of them that had a rubber gasket. As I remember, there was one that had a rubber gasket. Not of the ones that I called close references.

Q. I am asking about those that you described last week.

A. Yes, as I remember, there was one that had a rubber gasket. [839]

Q. Only one?

A. Well, that is all I remember offhand. I will be glad to go through them and look again.

Q. Take a look at the George patent and tell me whether or not that provides a washer or packing member, whether made out of rubber or some other sealing compound.

The Court: Do you want the witness to examine all these patents?

Mr. Freeman: I am going to at least ask him to examine those wherein he did not, in my opinion, at least, tell enough about them.

The Court: Well, the reason I am asking is that I want to quit a little early today.

Mr. Freeman: I am sorry. I suggest we adjourn.

The Court: We can let him examine these patents during the noon hour, since you have indicated

(Testimony of Harold W. Adams.)

what you want, and then he can come back after lunch and testify.

Mr. Freeman: Let me tell him, then, that there are some additional ones.

The Court: All right. Give him the names of the patents that you would like him to examine.

Mr. Freeman: Just those that he here produced.

The Court: I have a criminal matter set for 2:00 o'clock. It probably will not take very long to dispose of it. [840]

Mr. Freeman: Would you like to have us come in at 2:30?

The Court: No. I am just wondering whether you want to sit around and listen to a criminal matter being disposed of.

Mr. Freeman: It might be enlightening.

The Court: I don't think it will take very long. We will now recess until 2:00 o'clock this afternoon.

(Whereupon at 11:50 o'clock a.m. a recess was taken to 2:00 o'clock p.m. of the same day.)

(Testimony of Harold W. Adams.)

July 5, 1950, 2:35 o'Clock, P.M.

The Clerk: Parker Appliance Company vs. Masters and Collins.

HAROLD W. ADAMS

the witness on the stand at the time of recess, being heretofore duly sworn, resumed the stand and testified further as follows:

Cross-Examination
(Continued)

By Mr. Freeman:

Q. Can you give me the patents by number which include some sort of sealing means, such as rubber or the like?

A. The only ones I could find were Anderson, 535,236, in which there is an insert in the nose of the fitting, which I referred to in my previous testimony, and reading from the patent, line 63, it says:

“to respectively receive packing rings cc made of rubber or other equivalent material.”

The other one I could find, which you directed my attention to, is George, 326,425, which, however, only refers to gasket material in a modified version of the fitting. Reading from page 2 of the patent, line 15 says:

“Fig. 8.”

(Testimony of Harold W. Adams.)

and Fig. 8 is the only figure that I was able to find showing a gasket—— [842]

“Fig. 8 is a longitudinal section of a slightly modified form of the lining in which the flange against which the screw collar bears is set inward to accommodate a washer e.”

This is shown in Fig. 8. It is a washer designated by the small letter e. In Fig. 7 just above it, the fitting is shown without this washer, in the unmodified form.

Q. Are you through, Mr. Adams? A. Yes.

Q. Just so that we have the record complete as to your background, what school did you graduate from? That was not mentioned in your opening comments.

A. Why, a local technical school called the Western College of Aeronautics.

Q. When did you get out of that school?

A. In 1930.

Q. When you went to work for Douglas, that was in 1934? A. No, 1930.

Q. Right out of school? A. Yes, sir.

Q. What company's fittings were they then using?

A. I was not closely connected with the tube fitting part of the aircraft business until 1934 to know. I don't know in that period from 1930 to 1934. [843]

Q. What fittings were they using in 1934, what company's fittings?

A. I think they were using Parker fittings.

(Testimony of Harold W. Adams.)

Q. When you came out with the DC-3, Parker fittings were used? A. Yes, sir.

Q. And they were what we have here referred to as a two-piece fitting? A. That is right.

Q. And have they continued using the two-piece fitting in the DC-3s? A. No.

Q. When did they make the change from the two-piece fitting of 1934 to a three-piece fitting—and I assume they are now using a three-piece fitting?

A. That's right. It was made in the early part of the war as part of the war standardization.

Q. How about the DC-3s that came back for service and repair? Did you continue to use the fittings of the two-piece kind, or did you substitute a three-piece kind?

A. We substituted the three-piece kind.

Q. And likewise Douglas shortly after the war entered into quite a program of modifying the so-called old DC-3s to lengthen them out, give them a little more load capacity? A. That's [844] right.

Q. In other words, rejuvenate the old ships; correct? A. Yes.

Q. I take it that new fittings were used on the modified ships when they were made over?

A. Yes.

Q. And the new type fitting included the three pieces? A. Yes, we used AN standard fittings.

Q. And that included the angle on the sleeve of the fittings? A. Yes.

(Testimony of Harold W. Adams.)

Q. As a matter of fact, the two-piece fitting is a cheaper fitting than the three-piece fitting?

A. I don't know.

Q. Have you ever checked that end of it?

A. No, I never have.

Q. Did you have anything to do with recommending the use of the three-piece fitting over the former two-piece fitting?

A. Well, that decision was made by our hydraulics group and I remember their wanting to make all the fittings alike, and I believe I agreed with them.

Q. Well, you were part of that hydraulics group in those days? [845]

A. No. Wait a minute. I thought you were referring to the recent modification where the fittings were changed over for the super DC-3. At that time, I was not part of the hydraulics group. I thought you were referring to the—— [846]

Q. So that the record is straight, let me ask you when did you become part of Douglas Aircraft Corporation's hydraulic group? A. In 1934.

Q. And in 1934 I think it is your testimony they used the two-piece fitting? A. Yes, sir.

Q. And you continued on the hydraulics group from 1934 on; correct?

A. My responsibilities enlarged in 1941 and again in 1945, so that my work now covers more than simply the hydraulics group, and there is another engineer below me who is in charge of hydraulics.

(Testimony of Harold W. Adams.)

Q. All I want to get from you is did you have anything to do or did you have any voice in the change-over from the two-piece Parker fitting to the three-piece Parker fitting used on a DC-3?

A. I want to know which change-over you are referring to, the one in the early part of the war or the one last year? There have been two change-overs.

Q. I want the one where you went first from a two-piece to a three-piece. A. Yes, I did.

Q. Were there any costs considered or mentioned? A. No, I don't believe so. [847]

Q. You know as a fact that the three-piece fitting costs more money? A. No, I don't.

Q. When we are talking about a DC-3, we are talking about a commercial plane; correct?

A. Yes, sir.

Q. That is sold to private companies, such as——

A. No, that change-over took place at the time that we were building only C-47's for the Air Force. That did not take place on commercial airplanes.

Q. When you talk about a C-47 you are talking about the Army version of the DC-3?

A. That's right.

Q. Let's go to what you call the Super DC-3.

A. That was last year.

Q. That was work done on privately-owned airplanes? A. That's correct.

(Testimony of Harold W. Adams.)

Q. And in that case you used the three-piece fitting of the AN type; correct? A. Yes.

Q. And instead of the two-piece fittings, which were on the ship, when parts were rejuvenated and replaced you standardized and went all out upon the three-piece AN fitting; correct?

A. Upon the Super DC-3, yes, that's right. [848]

Q. There was no government requirement that you use AN fittings on those ships, was there?

A. No.

Q. That was just a choice or desire on the part of Douglas Corporation; correct?

A. Yes, to standardize fittings.

Q. And you could have used the old type two-piece fittings?

A. I don't know. Does Parker still make them?

Q. Yes. Don't you know?

A. No, I didn't know they still made them.

Q. That brings up the next question. Have you ever tested the difference between a two-piece fitting of the kind that was first used on the DC-3 in 1934 and the three-piece Parker fitting of the AN type? A. I have tested both fittings, yes.

Q. As to their operative characteristics?

A. Yes.

Q. Which fitting would you say was the better of the two fittings?

A. As far as holding pressure and so on is concerned, I haven't found any difference. The big advantage of the three-piece fitting of course is that it is so much easier to remove, and that is why we

(Testimony of Harold W. Adams.)

like it. Because it is only necessary to—well, perhaps I can describe it. In [849] disassembling or assembling the three-piece fitting it is only necessary to pull the line off the body by a distance equal to the length of the flare, and even then it is not necessary to pull it directly off, it can be pulled off at the angle of the flare, the nose of the fitting, 37 degrees. In the case of the two-piece fitting the nut is down in a hole in the body which has a depth of about $1\frac{1}{2}$ diameters of the two, which is to say it is down in a hole in the body probably five times and must be withdrawn a distance of probably five or six times as great and pretty nearly straight out, as compared with the three-piece fitting which only has to be withdrawn a very short distance and can be withdrawn at an angle. So if we have a rather short line going quite directly between two fittings, it is far easier to get the line off when the fittings are of the three-piece type. Because with the two-piece type it would be necessary to shorten up the line, or something. In fact, usually it is necessary to remove one of the two units at one end of the line, because we can't pull the fitting out—pull the nut and flared tube out of the fitting, if it is only a short line between two fixed fittings. So that is the principal reason why we went to that type fitting.

Q. You said in so far as holding pressures were concerned?

A. Yes. [850]

Q. Have you made any fatigue tests or vibration tests of tubes wherein you used the three-piece Parker type AN fitting, as against the two-piece

(Testimony of Harold W. Adams.)

Parker type fitting that you used on the DC-3's in 1934? A. Yes.

Q. Which worked out best?

A. I don't remember any significant difference between them. They all break off at the base of the flare.

Q. There are other problems over and above just sealing pressure; correct? A. Yes.

Q. There is what we call vibration?

A. Yes.

Q. Fatigue? A. Yes.

Q. And there is turbulence, that is, shock tests of the flow of fluid through the pipes or tubes?

A. That is a pretty negligible effect in hydraulic work.

Q. You didn't mention anything about that in your book, did you? You wrote a book?

A. That's right. Through fittings?

Q. Through the pipes of which the fittings become a part or bring about the union of one pipe with respect to another pipe. [851]

A. Sure, I told how to calculate it.

Q. Isn't it a fact that turbulence sets up certain kinds of strains that bring about a rupture of the pipes or tubes?

A. You are using terms that I am not——

Q. I am just trying to use them as an ordinary layman.

A. And I am trying to interpret what you mean.

Q. You follow me as long as I use the word "turbulence"?

(Testimony of Harold W. Adams.)

A. The principal disadvantage of having changes in section in a pipe, which I gather is what you are talking about, is that it increases the resistance to flow slightly through the fittings. This is a rather minor effect through fittings. It is larger where you have smaller holes and restrictions, as in valves and so on.

Q. Maybe I used the term "shock." Perhaps it would have been better to use the word "impulses." Do you understand what I mean by pulsations within the line? A. Yes.

Q. Does that set up vibrations? A. Yes.

Q. Is that to be avoided, if possible?

A. Certainly, the shock is.

Q. The fact that you have a three-piece fitting, does that help any at all in eliminating fatigue brought about by vibrations? [852]

A. Not that I have ever found out.

Q. Have you ever observed a flare that has been removed from a two-piece fitting, as to whether or not there has been any scorings on the flare?

A. I presume you mean on the back side of the flare?

Q. Yes. A. Not the sealing surface.

Q. I am talking about the back side.

A. Yes, you can see marks on the back [853] side.

Q. Isn't it true that whenever you have a scratch mark or a scoring, that you have a greater opportunity for fatigue or rupture at that point than at some other point of the tube?

(Testimony of Harold W. Adams.)

A. Yes.

Q. So that these markings or scorings do have their ill effect?

A. Well, offhand, I would certainly think they would, but it doesn't seem to be borne out by test, particularly.

Q. You know, as an engineer, it is desirable not to have outside of the flare, the back side, using your term, scored? A. Yes.

Q. It is something to be avoided; correct?

A. Yes.

Q. Now, the Douglas Company does provide torque wrenches for its operators? A. Yes.

Q. For its mechanics? A. Yes.

Q. And they sometimes, notwithstanding the use of torque wrenches, still overtighten; correct?

A. I suppose they do, although the operators in service, I think, are principally responsible for any overtightening [854] that goes on.

Q. When you say "operators in service," you are talking about out in the field? A. Yes.

Q. In other words, the problems are greater when you are away from the Douglas plant with close supervision as given by the Douglas Corporation; correct? A. That's right.

Q. But notwithstanding the fact that you tell someone or instruct someone to use 200 pounds torque, they nevertheless overtighten?

A. It occasionally happens, yes.

Q. And they do that overtightening notwithstanding that there is supervision on the job?

(Testimony of Harold W. Adams.)

A. Yes.

Q. And they do that overtightening notwithstanding the fact that you check and you inspect as well as you can? A. Yes.

Q. Now, it is desirable to guard against that kind of overtightening, if at all possible, isn't it?

A. Yes.

Q. It is something to be avoided? A. Yes.

Q. It was really that overtightening that brought about, using your term, the suggestion of cutting the inside [855] angle of the flare on an $18\frac{1}{2}$ degree angle, so that in the event there was overtightening, there would be less likelihood of shearing the flare off and having the tube pull away from the fitting; correct?

A. That is correct. That was done in the early part of the war, incidentally, when we did not have torque wrenches.

Q. Would you say that you could go back to the old style now that you have torque wrenches?

A. I don't know whether I would—I don't think I would recommend going back to it, no.

Q. In other words, notwithstanding the fact that you have torque wrenches, there is a desire to have the added degree of safety? A. Yes.

Q. Sufficient to take care of the safety element?

A. Well, we can't see that does any harm.

Q. It does do some good? A. Yes.

Q. And it does good at a time when someone disregards instructions or proceeds to torque up a little higher than he should?

(Testimony of Harold W. Adams.)

A. That is correct.

Q. So that what you have suggested here, using again your term, was something that would give just an added degree [856] of safety at the fitting where the tube is connected to a body member; correct?

A. Yes.

Q. And if, of course, the operator just follows exactly the instructions that you initially give him with respect to torquing, you wouldn't necessarily have to provide the added safety feature?

A. That is right.

Q. So that your added safety feature is something that is only brought into play when someone does something not according to instructions?

A. That is correct.

The Court: May I ask a question?

Mr. Freeman: Yes.

The Court: Is that sleeve that you have got upon the model there the sleeve that is being used now?

The Witness: Yes, sir, in the small sizes, in the copper silicon sleeve, that is used with the aluminum tubing.

The Court: That is not the sleeve described in the Parker patent in question, is it?

The Witness: That is the AN sleeve.

The Court: I am talking about the angle there. What is it, 18 degrees——

The Witness: You mean, does it look like the figures of patent 2,212,183? [857]

The Court: I am asking you.

(Testimony of Harold W. Adams.)

The Witness: No, it doesn't look like this sleeve.

The Court: In other words, the sleeve that you are using today is not in all respects the sleeve that is in the patent in question, is it?

The Witness: No, I don't think so.

The Court: I am asking you.

The Witness: Well, no.

The Court: Although there does appear to be on Fig. 2 an angle between c and b?

The Witness: Yes. However, this is quite a small angle, and in Fig. 3, where the fitting has been tightened, this angle disappears. That does not appear in our fittings having the $18\frac{1}{2}$ degree angle.

The Court: Is that a tightened fitting there?

The Witness: No. That is an untightened fitting there. But when they are tightened up, it doesn't get full bearing on that surface.

The Court: What I want to know is this. Is the sleeve you are using today the sleeve that is described in patent 2,212,183?

The Witness: The reason why I am hesitating is because we use two types of sleeve today, one type that is cut away to this $18\frac{1}{2}$ degree angle, and one that is not. Certainly, the one that is cut away—— [858]

The Court: I thought you told me that is the one you were using.

The Witness: In the small sizes, in the copper silicon sleeve.

The Court: All right. In the small sizes, is

(Testimony of Harold W. Adams.)

that the sleeve that is described in patent 2,212,183, in small sizes?

The Witness: No.

The Court: Is that the standard sleeve?

The Witness: Yes, sir. That is the AN standard sleeve.

The Court: Is that the sleeve that is made by either one of the defendants?

The Witness: Yes.

The Court: Which one makes that sleeve?

The Witness: They all do, as far as I know.

The Court: Is that the sleeve that is made by Parker?

The Witness: Yes.

The Court: You mean Parker is making that sleeve?

The Witness: Yes.

The Court: And that is not the sleeve that they have described in the patent?

The Witness: As far as I know, that is the only sleeve they are making in copper silicon in the small sizes.

The Court: Excuse me for breaking in.

Mr. Freeman: Are you through? [859]

The Court: Yes.

Q. (By Mr. Freeman): Mr. Adams, the drawing that we have here, Defendant's Exhibit VV, shows a portion of the nose end or a portion of the sleeve in engagement with a portion of the flare; correct? A. Just out of engagement.

Q. When you say "just out of engagement,"

(Testimony of Harold W. Adams.)

you mean it is finger tight or before the parts have been tightened up?

A. Not quite touching, just a slight air space between them.

Q. As we start to screw the nut up, it is a fact that the sleeve will then move longitudinally along the tube and engage the flare; correct?

A. Yes.

Q. And as it engages in the flare, does it, as a fact, imbed itself in the flare of the aluminum tube? A. Yes.

Q. And as it imbeds itself in the flare of the aluminum tube, it is a fact that the space which is indicated in white between the red and the yellow on the drawing actually becomes smaller in size? A. Yes.

Q. So that you have initial contact of one dimension when you start the sleeve at finger tight position, and another [860] area contact after the sleeve has been moved home?

A. The contact area increases as the red sleeve imbeds itself in the back of the tube vv.

Q. And as that contact area increases, the corollary to that is that the clear white portion between the red sleeve and the yellow tube and flare becomes less in overall size?

A. That's right, yes.

Q. And the amount of the disappearance of that white portion between the red sleeve and the yellow tube depends upon the torque pressure used?

A. That's right.

(Testimony of Harold W. Adams.)

Q. Now, the drawing that you had or, rather, the photograph that you produced of a Douglas DC-3 investigation that you made——

The Court: Before you get onto that, Mr. Freeman, could I ask you a question?

Mr. Freeman: Yes.

The Court: In comparing the sleeve in the diagram on the blackboard and the sleeve in the Parker 2,212,183, it is very obvious that the two sleeves are not identical in shape and in form. It has been agreed, I think, by all concerned that the only thing that is important here is the sleeve.

Mr. Freeman: There is a little more to it than that, [861] your Honor. I followed up your question of this witness so that I didn't run away from what your Honor said and what this witness said to you when I brought out, and I again repeat, that the white portion between the red sleeve and the yellow tube and flare diminishes in size so that you have what we call in claim 1 initial contact of an area less in overall size, so that when you drive the sleeve on home to bring about the final sealing, whether that white spot completely disappears or is only 40 per cent or 50 per cent, you still have the sum and substance of claim 1 of that patent when you have initial contact adjacent or close to the lower end or the toe end of the flare, and that you have greater contact as the nut is driven home to bring about the complete sealing.

The Court: Well, I didn't get to my question. I was just laying the foundation and you ran away

(Testimony of Harold W. Adams.)

with the ball. Now we will start all over again. The witness testified that the sleeve on the black-board was the sleeve that Parker was making. Is that correct?

Mr. Freeman: Oh, yes. It is one of the sleeves that Parker is making, just as it is one of the sleeves that the defendants in this case are making. It is the sleeve that has what we might call a double angle on the inside. [862]

The Court: Well, what I am trying to get at——

Mr. Freeman: We make that sleeve, yes.

The Court: That is one of the Parker sleeves?

Mr. Freeman: Yes, we make that sleeve.

The Court: And your contention is that that sleeve as made is according to the claims in your Parker patent?

Mr. Freeman: It is strictly in accordance with claim 1 of the Parker patent. It would not be in accordance with claim 2 of the Parker patent. It would be in accordance with claim 3 of the Parker patent.

The Court: To show my ignorance of patent law—and I admit that I am in the presence of experts—if you have a drawing in your patent, and your drawing discloses the form of the object, when you manufacture that object do you have to follow that particular form?

Mr. Freeman: I am very happy that your Honor asked that.

No. You have to show in a patent of the kind that we have here, or in any patent, a complete

(Testimony of Harold W. Adams.)

specification or an embodiment by which you can accomplish the end result which is called for in the claims. You do not have to follow exactly—let's say in one case there is an angle of 45 degrees, whether you make it 46 or 48 or 43 is of no consequence. What we make there and what we show in that drawing, and what we describe in the patent specification, is an [863] embodiment by which you can accomplish this result.

Now, take claim 1. We show in our disclosure of the patent drawing, and of the patent specification, which is nothing more than a word picture of what is shown in the patent drawing, a basis for writing a claim as broad as we can write. Now, if that claim 1—and that is what I am talking about—is directed to a sleeve in combination with a fitting comprising a nut and a body portion, for use with a tube, wherein you have what we call toe contact, in other words, we have initial contact, I think those terms have been used to mean one and the same, and as the sleeve is brought home for bringing about the sealing against the flare, you then have more than initial contact, but you have a greater area contact.

I haven't used the exact words of claim 1, but I have tried to use lay language, your Honor, in describing what we have in claim 1, and it is our position, and it was the reason for my examination of this witness on the very chart that they here produced, Defendants' Exhibit VV, where I brought out that you have a given amount of

(Testimony of Harold W. Adams.)

contact initially when the unit is what we call finger tight or just at the start, then as we apply pressure or torque, as it is sometimes used, to bring about a complete sealing, you then have greater area contact than you initially had for bringing about a complete seal. Now, that is claim 1. [864]

I think this is a good place for a recess.

The court: Well, all right. We will now recess to 25 minutes after three.

(A recess was taken.)

Q. (By Mr. Freeman): Of those 600 men at Douglas under your employ, how many of those are technical men? A. About 250.

Q. I think you were a member of the A6 Committee?

A. I was the first chairman of the Committee A6.

Q. Did you as chairman of that committee come in contact with Roland Berg, hydraulics engineer of the Republic Aviation Corporation?

A. Yes, I did.

Q. Is he a high-grade individual as you know him? A. As far as I know, yes.

Q. You have had a lot of contact with him?

A. Not a lot. Very little. Only at eastern meetings.

Q. You know him, though, as a hydraulic staff engineer of Republic Aviation Corporation?

A. Yes.

Q. I take it that you know that he too was on that A6 Committee at times?

(Testimony of Harold W. Adams.)

A. I don't remember his being on A6 at the time I had it. He has been on it later.

Q. Do you know Mr. Davies? [865]

A. Bob Davies?

Q. Yes. A. Very well.

Q. And he is with Parker Appliance Company?

A. That's right.

Q. I take it you have high regard for him, too?

A. I have, indeed, yes.

Q. As an engineer? A. Yes.

Q. As a hydraulics engineer? A. Yes.

Q. And you and he have at times discussed hydraulics problems with respect to fittings?

A. Yes.

Q. Let's turn to the Guyer patent No. 196,084, which is No. 4 in your book, your Honor, and I believe that you said it was one of the best references in answer to Mr. Huebner's examination of you this morning; correct? A. Yes.

Q. Now, that particular pipe coupling, as the patentee says, relates to a lead pipe; correct?

A. Yes. Well, I think so. Let me see. Yes.

Q. And it is true that in Figures 2 and 3 of the patent the sleeve on the inside, or the thing that you call the sleeve, has some corrugations or teeth and grooves? [866] A. Yes.

Q. And it is likewise true that the body member in Figure 3 includes some teeth and grooves?

A. Well, there don't seem to be any in my copy here. I don't see any.

Q. Will you turn to Figure 2, and you there note the small letter v, do you not? A. Yes.

(Testimony of Harold W. Adams.)

Q. And you note that the lead line in one case projects from above the figure to the upper surface of the flare of the pipe; correct? A. Yes.

Q. And you notice another lead line v, from within the pipe itself, projecting upwardly?

A. Yes.

Q. Do those both go to the same corrugations and grooves, or do they go to grooves which engage with the inside of the flare, as well as to grooves that engage with the outside of the flare?

A. Well, it looks to me like they just engage the outside of the flare. [867]

Q. Have you read the patent carefully?

A. Yes. I couldn't quote it word for word right now. Fig. 1 doesn't show any grooves on the outside of the male member.

Q. Fig. 1 also includes the figure on the left-hand side; correct?

A. I was referring to the right-hand side of Fig. 1.

Q. Well, on the left-hand side, that is still part of Fig. 1; correct? A. Oh, yes.

Q. And in that particular case, the flare on the pipe L is made on the job, isn't it?

A. Well, I would have to read the patent to find out. It shows them disassembled, of course. Yes, it is intended to be flared on the job.

Q. And that particular flare that is then formed by putting the parts together includes really two different angles on the flare?

A. Yes, that is correct.

(Testimony of Harold W. Adams.)

Q. Have you ever used a pre-formed flare with two angles on the flare itself?

A. Let me see. I don't remember any.

Q. Of course, there is no problem so long as you use a lead pipe. It flows or conforms readily to any contour between two hard members; [868] correct?

A. Well, yes. But, incidentally, I may have answered your other question wrongly in a way. We do make what we call double flares on aluminum tubes in which we first expand the tube and then reverse it completely back on itself. We do this commonly in oxygen system tubing, in which the flare is bent completely back on itself, 180 degrees.

Q. But in that case, as far as the seat is concerned, it is a single seat?

A. Yes, that is right.

Q. And in this particular case, there are two seats on the body member against which the lead pipe L rests; correct?

A. That is correct.

Q. Let's take Fig. 2 or Fig. 3. You go along with me that the inside of the sleeve includes grooves and ribs which imbed themselves within the lead pipe; correct?

A. Yes.

Q. Would you be able to remove that sleeve easily in the event of disassembly of the parts?

A. No, I wouldn't think so.

Q. Is it desirable at times to pull the sleeve back away from the flare?

A. Well, I can't think of any good reason to.

(Testimony of Harold W. Adams.)

Q. Is it true that after a fitting has been connected and then disconnected, that the parts assume a position when [869] used the second time different than the parts assume when first used?

A. Yes, slightly.

Q. In other words, if there is some expansion of the flare itself, it takes a set so that when you start to use that flare a second time, you have a larger flare?

A. The flare changes slightly with each tightening usually.

Q. And thus in order to get the same amount of torque and in order to get the same amount of sealing contact, or effective sealing contact, do you change the torque any?

A. No.

Q. It is true, though, when using, say, 200 pounds torque the second time or the third time or the fourth time, that the sleeve will imbed a little more within the flare?

A. Yes, that is true.

Q. So that you have a different type of operation the second and third and fourth time?

A. Not a different type. The dimensions are a fraction of a thousandth different.

Q. Dimensionwise, there is a change?

A. Yes.

Q. I think you go along with me that if it took five times torque on your Exhibit VV to shear [870] the flare off of the tube the first time, that it might take only two or three times torque if it were done the second or third time?

A. That is right.

(Testimony of Harold W. Adams.)

Q. So that with each use or assembly of the fitting and then reassembly, which, of course, is a requirement, a different condition actually exists with respect to possible overtorquing?

A. Well, there is a slight difference in degree, not a difference in type or kind.

Q. The difference in degree is in one case you have to overtorque five times and in another case you have to overtorque only two times?

A. No. I think that is not quite right. The difference in degree is that the first time you might have to overtorque five times and the next time you might have to overtorque perhaps only four and nine-tenths times, and by the time you had done this 20 or 30 times, you might then have to only overtorque three or four times. It is not the difference between 5 and 2 in one operation at all.

Q. It is not?

A. No, it is not that much.

Q. Have you read your book recently on overtorque?

A. No, I don't think so. As a matter of fact, I don't believe I have. [871]

Q. Do you recall stating as a fact in your book that initially it required five times overtorquing, whereas if it were used the second or third time, it might only be twice or three times overtorquing to shear off the flare? A. No.

Q. You don't recall that?

A. Not offhand, no. I may have said it, however.

(Testimony of Harold W. Adams.)

Q. Well, I take it whatever you said in your book was predicated upon factual tests that you yourself ran?

A. Tests that I had made at that time, yes.

Q. Now, I meant to ask you before recess whether or not the photograph that you here produced from the Douglas files, Defendants' Exhibit UU——

A. Yes.

Q. ——was that one of a special test that you ran or is it one taken from the cracked-up DC-3?

A. Well, it was not a DC-3. It was an A-20, as I remember. But that was a special test.

Q. This has nothing to do with the DC-3 failure about which you testified?

A. Except that it was not a DC-3. It was an A-20, as I remember. That was made as a consequence. This is a test that was made as a consequence of that trouble. This is one of a series of tests.

Q. Can you tell me what torque was used to bring [872] about this result?

A. I would have to refer to the report to get the exact figure.

Q. Do you know whether it was five times, three times, or two times normal torque?

A. Well, let's see. I don't know. I don't remember exactly. It must have been somewhere around, I would say offhand it was probably three or four times. It is in the report, however. [873]

Q. Would you mind producing that report in the morning?

(Testimony of Harold W. Adams.)

A. I think so. In fact, we may have those pages around here.

Mr. Huebner: I think we have it here today, if you want it.

Mr. Freeman: May I borrow it this evening?

Mr. Huebner: I will have to ask the witness to identify it, though, among some papers I have got, if that is agreeable.

Mr. Freeman: We will get it after 4:00 o'clock and not take the court's time.

The Witness: The Parker Company has a copy of that report, too; however, you may not have it here, of course.

Q. (By Mr. Freeman): Will you now turn to the McConnell patent, which is No. 290,446, Defendants' Exhibit TT.

The Court: What number is that in the book?

Mr. Freeman: That is No. 5, your Honor.

Q. (By Mr. Freeman): That patent specifically refers to the use of lead pipe, does it not?

A. No, it doesn't. It says in line 20,

“including a hard metal pipe with a soft metal connecting pipes of different materials together,”

and refers to soft metal pipes. It seems to say all along [874] “soft metal.”

Q. What is that?

A. It seems to say “soft metal.”

Q. Isn't it true that in Figure 1 on the left-hand side you there have a lead pipe A?

(Testimony of Harold W. Adams.)

A. Are you reading from the patent?

Q. No. I am just looking at the drawing, Figure 1.

A. I don't know how you can tell it is lead from looking at the drawing.

Q. You go ahead and look at the patent specifications. I thought you knew.

Well, you go along with me that it is a soft metal pipe A?

A. Yes. It is not a lead pipe. It is a soft metal pipe.

Q. The pipe A3, on the other side of that figure, what does that refer to?

A. That is referred to as a hard metal pipe.

Q. When you connect a hard metal pipe to a body member, you then use an insert piece A2; correct? A. Yes.

Q. And that insert piece then on the right-hand side, that is of soft metal? A. Yes.

Q. It serves very much as a packing? [875]

A. Yes. Just as the flare of pipe A does on the left-hand side.

Q. When you seal a lead pipe or a soft metal pipe, do the parts take a set? A. Yes.

Q. So that with each operation you change the conformation of the flare, and once it has been changed due to the torque used it remains in exactly that position?

A. Practically exactly that position.

Q. Well, soft metal that will flow or yield or give will take a set; correct?

(Testimony of Harold W. Adams.)

A. All metal, to the best of my knowledge, will take a set. There is no definite distinction in engineering, that I know of, between soft and hard. I refer to it as being material softer than the material of the fitting, when I am talking about soft metal. And that is normally what is used in aircraft. We normally use a tubing which is softer than the material of the fitting.

Q. 52SA?

A. 52S02. That is Aluminum Company of America's designation.

Q. Is it true that in the type of connection shown in Figure 1 of the McConnell patent on the right-hand side that the packing member will be compressed when the nut D is tightened? [876]

A. It will be deformed. I don't think "compressed" is a proper word.

Q. When we talk about "deformed," using your terminology, is it true, then, that the cross-sectional area of the member A2 will lengthen out?

A. The length of the part will increase, yes.

Q. Isn't that sometimes called cold flow of metal?

A. No. Cold flow refers to a movement after parts have been put into position, not while they are being positioned. After parts have been put into position if the material then continues to move, that is called cold flow.

Q. And it is a fact that the shoulder of the sleeve, calling it that, in Figure 1 of the McCon-

(Testimony of Harold W. Adams.)

nell patent, is directly opposite the angular portion on the inside of the sleeve? A. Yes.

Q. And substantially midway or at least forwardly somewhat of a mid-point on the angle of the sleeve on the inside?

A. Well, it isn't forward of a mid-point. It is just about at the mid-point.

Q. And it is true that in the drawing Figure 1 of the McConnell patent that the enlarged portion of the sleeve engages or is shown in contact with the inner wall of the nut D? [877]

A. Well, it is shown in contact. I would say that normal manufacturing clearance would exist.

Q. Would you call that a slide fit, loose fit, or what kind of fit would you call it?

A. That would depend on how Mr. McConnell made them, I think.

Q. Can't you tell from the patent drawing?

A. No.

Q. Speaking about how Mr. McConnell made them, have you ever seen a fitting corresponding in all details to the McConnell patent?

A. No.

Q. While I am at it, I am going to ask you the same question with respect to the Guyer patent No. 196,084. A. No.

Q. Have you ever seen a fitting corresponding exactly to the Bjorling publication?

A. No. Wait a minute. Just what do you mean by exactly? How exactly?

Q. Have you ever seen a Bjorling fitting?

(Testimony of Harold W. Adams.)

A. No.

Q. I am going to ask you the same question with respect to Parker patent No. 1,977,241.

A. No, I have never seen one exactly like that.

Q. Have you ever made any for test, or otherwise, [878] corresponding to the Parker patent No. 1,977,241? A. No.

Q. So your testimony was just your opinion as an engineer in hydraulics?

A. Wait a minute. My testimony in what respect?

Q. In respect to the Parker patent, as to whether it would or wouldn't work, or what it would do.

The Court: When did he testify to that?

Mr. Freeman: He is talking about this particular patent.

The Witness: I don't remember testifying to that. Perhaps you can read that back to me.

Q. (By Mr. Freeman): Let me reframe my question. Your testimony about not making the head solid was predicated only upon a reading of the patent itself?

A. Testimony on not making the head solid? I am afraid I still don't—I am sorry to be so stupid here, but I am sorry I don't follow you exactly. What did I say about not making the head solid?

Q. I will let the record speak for itself.

A. Yes, I would like to hear it.

Q. Isn't it a fact that in the Parker patent No. 1,977,241 Mr. Parker was directing his attention there to misalignment of the parts?

(Testimony of Harold W. Adams.)

A. That's correct. [879]

Q. And in that case he provided instead of a straight shoulder-to-shoulder contact between the sleeve and the nut, an arcuate or spherical contact?

A. That's right.

Q. And in that particular case he permitted the parts to position themselves out of alignment and still have a contact between the shoulder and the upper portion 10 of what you have called the sleeve?

A. That's correct. [880]

Q. And in Fig. 2 of the drawings, he shows the parts so misaligned?

A. That is correct.

Q. And in the Parker patent, Plaintiff's Exhibit No. 26, which is No. 1,977,240, I think you testified that the shoulder engaged the sleeve so as to compress the sleeve inwardly against the flare of the tube; correct?

A. I said there would be a hoop compression applied to the sleeve by the shoulder.

Q. And by compression, that means inwardly directed as distinguished from expansion?

A. That is right.

Q. And the Parker patent in suit refers to hoop tension or expansion, does it not?

A. Well, not in that region, as I remember. I think it refers to it at the toe of the sleeve, doesn't it? Well, the patent in suit, as I interpret it, says—in fact, as I read it, on line 69, it says—this is page 2, line 69.

Q. You are reading from the patent in suit?

A. Yes.

(Testimony of Harold W. Adams.)

Q. Proceed.

A. "whereby the clamping face of the head against the tube end is determined by the spring tension of the metal forming said head."

I assume that means in the region where the head is in [881] contact with the tube end and the region where I am talking about hoop compression is at the opposite end of the sleeve head. There would be hoop tension in the toe of the sleeve in the fitting of patent No. 1,977,240, I believe.

Q. Have you studied the file wrapper of the Parker patent in suit? A. Yes. I read it.

Q. Have you read the file wrapper of Parker patent 1,893,422? A. I don't think so.

Q. That is the one that is referred to in the patent in suit in the first paragraph.

A. I believe that I only read one file wrapper.

Q. Then I take it you didn't read the file wrapper on 1,977,240, either?

A. I think that is right.

Q. And then I take it you are not familiar with the file wrapper references or the references referred to by the Patent Office during the prosecution of the two Parker patents, 1,893,442, and 1,977,240?

A. Yes, I think that is right.

Q. Do you know anything about Patent Office classification? A. No, sir.

Q. Do you know how the Patent Examiner keeps the [882] prior art, the reference patent, that he refers to on any given subject? A. No, sir.

(Testimony of Harold W. Adams.)

Q. Turning now to Benzion, Patent No.——

The Court: Mr. Freeman, before you get into that, I notice it is 4:00 o'clock, and maybe we'd better desist until tomorrow.

We will stand at recess now until 10:00 o'clock tomorrow morning.

(Thereupon, at 4:00 o'clock p.m., an adjournment was taken until 10:00 o'clock a.m., Thursday, July 6, 1950.) [883]

Thursday, July 6, 1950

The Clerk: Further trial in the Parker Appliance v. Masters and Collins matters.

HAROLD W. ADAMS

called as a witness by the defendants, having been previously sworn, resumed the stand and testified further as follows:

Cross-Examination

(Continued)

By Mr. Freeman:

Q. Will you turn to the Hewitt patent No. 1,820,020—No. 16 in your book, your Honor—and tell me, Mr. Adams, if there is provided a space between the sleeve member and the inner wall of the nut substantially as is shown in the Bjorling publication. A. Yes.

Q. And in that case, that is, in the Hewitt patent, the walls of the sleeve and the inner wall of

(Testimony of Harold W. Adams.)

the nut are parallel with each other? A. Yes.

Q. That is the space at the region of contact is substantially or is identical with the space at the toe of the sleeve?

A. Yes, except for the radius of the nut.

Q. You know that the Hewitt patent was a file wrapper [885] reference?

A. I don't remember.

Mr. Freeman: For your Honor's information, a file wrapper reference—Mr. Huebner may have explained this to the court—is a patent reference that was considered by the Patent Office, and specifically referred to by the Patent Office during the prosecution of the patent in suit.

The Court: I understand that. But the thing I am wondering about is how much force and effect the court should give to the file wrapper. Does the finding of the Patent Office, or the Patent Commissioner, that a patent should be issued, is that binding in any way upon the court?

Mr. Freeman: Is is not binding upon the court, but it raises a presumption that those skilled in doing this particular kind of work, the Examiner, the Commissioner, have carefully checked the prior art patents, and that they considered it to be an invention, that is, the Parker patent in suit was allowed over and above the Hewitt patent with the two straight walls equally spaced apart throughout their length.

The Court: Then there is just a presumption?

Mr. Freeman: That is correct.

(Testimony of Harold W. Adams.)

The Court: And if all other things are equal, then the presumption should be the controlling factor?

Mr. Freeman: Right. [886]

Q. (By Mr. Freeman): Now, Mr. Adams, you kindly let me have the Douglas Aircraft Company report from which the defendant offered in evidence a photograph as Defendants' Exhibit UU; that is correct, is it not? A. Yes.

Q. And I hand you another photograph from that report which is Figure No. 3, photograph No. 22695, and that, too, is a photograph from the same report; correct? A. Yes, sir.

Mr. Freeman: I would like to offer in evidence as Plaintiff's Exhibit 78 the photograph produced by the witness Adams, being photograph No. 22695, Figure 3.

The Court: It may be received.

The Witness: That is a photostat, isn't it, rather than the one from the report? I would like to keep the report and let you use a photostat of it.

Mr. Huebner: We have an extra photographic copy if it may be substituted.

The Witness: I think that is a photostat of it that he has.

Mr. Huebner: We actually photographed the photograph.

Mr. Freeman: I would like to substitute the photograph of the photograph so that the original may remain in the files of the Douglas Company.

The Court: It may be substituted. [887]

(Testimony of Harold W. Adams.)

(The photograph referred to was marked Plaintiff's Exhibit 78, and was received in evidence.)

Q. (By Mr. Freeman): And in the photograph, Plaintiff's Exhibit 78, you there used a sleeve having an outside angle on it?

A. Well, I don't remember it exactly. I will have to look at it. [888]

Q. Well, can you tell from looking at the photograph?

A. Well, let's see. It is hard to tell whether that is on the—yes, I think this sleeve has an outside angle.

Q. And the photograph is magnification of 30 times actual size?

A. I don't think it is that much, no.

Q. So that I am straight, is the magnification of the photograph that I have produced as Plaintiff's Exhibit 78 the same magnification as the photograph which you produced as Defendants' Exhibit UU?

A. Well, it is approximately the same.

Q. Well, now, do you recall what magnification you gave us with respect to Defendants' Exhibit UU?

A. No, I don't. I am pretty sure it is not 30 times, because that would make a quarter-inch tube come out 30 quarters or $7\frac{1}{2}$ inches, and that obviously isn't $7\frac{1}{2}$ inches.

Q. Well, will you agree with me that the magnification of Fig. 3, which I have produced as Plain-

(Testimony of Harold W. Adams.)

tiff's Exhibit 78, is substantially the same magnification that you testified to with respect to Fig. 2?

A. Yes, it is approximately the same.

Q. At the time that you ran your tests in October, 1940, were torque wrenches available?

A. I believe that in those tests we used an ordinary [889] wrench with a spring scale on the end of it, although we might possibly have used a torque wrench. In any case, the torques were measured.

Q. I take it you haven't seen any fitting actually manufactured in accordance with the Benzion patent which you referred to.

A. No.

Q. The Bjorling publication shows the screw threads projected out beyond the wall of the sleeve; correct?

A. Yes.

Q. In other words, the smooth portion of the inside of the sleeves is undercut?

A. Yes.

Q. Using that term.

A. Yes, that is correct.

Q. So if there is any expansion of the sleeve within the nut, there is greater likelihood of coming in contact with the threads than if the wall and the threads were of the same diameter?

A. No, no greater likelihood. If it expanded——

Q. In other words, in Bjorling, if you expand into the undercut, will the nut back away easily?

A. No.

Q. Can you tell me whether or not Plaintiff's Exhibit 78, which is Fig. 3 of your report, illus-

(Testimony of Harold W. Adams.)

trates the fitting at [890] the recommended torque of 63 inch pounds for size $\frac{1}{4}$ by .032?

A. Yes, as I remember, that is correct.

Q. And that is what your report states?

A. Yes.

Q. In other words, you there have what may be referred to as normal torque?

A. That's right.

Q. And in that case the sleeve has imbedded itself in the flare of the tube; correct?

A. Slightly, yes.

Mr. Freeman: That's all [891]

Redirect Examination

By Mr. Huebner:

Q. Mr. Adams, on the lead tube physical exhibits which you produced yesterday, and which are in evidence, it was called to your attention, I believe, that the length of the flares on the tubes was some 20/1000ths less than standard length for aluminum or other metallic tubes? A. Yes.

Q. What would be the effect on those lead exhibits if the flares were made standard length?

A. I think there would be no appreciable effect, because the flare as made extended beyond the end of the sleeve.

Q. Now, some comments were elicited from you in cross-examination concerning the advantage of the easy removal of a three-piece fitting over a two-piece fitting. A. Yes, sir.

(Testimony of Harold W. Adams.)

Q. Are those advantages any more present or pronounced in the subject disclosure of the Parker patent in suit than in any generally similar three-piece fitting having the cooperating parts of a body, a sleeve, and a nut? A. No.

Q. Is there any advantage with respect to removal of the three-piece fitting demonstrated in the Parker patent in suit over the previously known AC-811 fitting? A. No. [892]

Q. Or over the McConnell patent 290,446?

A. No.

Q. Some point was made or discussed concerning the advantage of safety from over-torquing obtained by the double angle shown in Exhibit VV, the chart hanging on the blackboard; may that same advantage from overtorquing be obtainable by use of the structure shown in the Parker prior patent 1,977,241?

That is No. 18, I believe, in your Honor's book of patents.

A. I could not say without test whether the 10-degree difference shown in Figure 3 of the patent 1,977,241 is sufficient to produce the effect that is obtained by this sleeve shown in Exhibit VV.

Q. Is the same principle involved in both, the Exhibit VV and the Parker patent 1,977,241?

A. Yes, the same principle is present in that there is a considerable angular difference between the nose of the fitting and the inside angle or countersink of the flare. I meant "sleeve," the last word I said.

(Testimony of Harold W. Adams.)

Q. I direct your attention to the language in the last few lines of claim 1 of the patent in suit, 2,212,183, beginning in line 17, as follows:

“whereby during the clamping action said head will be expanded and moved forward [893] along the flared end of the tube into intimate contact with the outer surface thereof”

and I emphasize the next words:

“through substantially the entire extent of the flared surface on the sleeve head.”

In the normal torquing installation of the double angle assembly illustrated in Exhibit VV, will that condition or relationship be present?

A. No.

Q. To clarify any possible question in the court's mind as to the two forms of sleeve manufactured under the AN standard, I will ask you again if VV illustrates one of the forms, namely, sizes six, four and two, which are manufactured under the AN standard using a specific kind of metal.

A. Copper silicon sleeve, yes.

Q. All right. Now, refer to Exhibit O and state whether this exhibit illustrates the other AN standard sleeve manufactured by the defendants and by Parker.

A. Yes, this illustrates the AN standard sleeve that is not cut away at the $18\frac{1}{2}$ -degree angle. [894]

Q. Now, there are those two types, then, of

(Testimony of Harold W. Adams.)

standard sleeves manufactured under the AN series? A. That is correct.

Q. And no others? A. That is correct.

Q. On Exhibit O, is the outside angle on the flare of the tube and the inside angle of the sleeve the same? A. Yes.

Q. Then again directing your attention to those same lines which I quoted a moment ago from claim 1 of the patent in suit—withdraw that question and start it over.

Directing your attention again to claim 1 of the patent in suit, 2,212,183, and reading the following language from that claim:

“said head having the inner surface thereof provided with a coniform flare so shaped that the initial contact of the head with the flared end of the tube is at the free end of the head and adjacent the outer end of the flared end of the tube.”

Is it ever possible that the relationship described in the language quoted from the claim may be obtained by the use of the AN sleeve and its related parts illustrated in Exhibit O? A. No. [895]

Q. There was some discussion in your cross-examination concerning the transition area, which is apparently the arc adjoining the longitudinal outer surface of the tube with the angular surface of the flare. I believe the point was made that in Mr. Masters' drawing, prepared in collaboration with you, Exhibit VV, it was not fully representative

(Testimony of Harold W. Adams.)

of the facts in that the division lines showed the flare as commencing outside of the transition area, thereby purportedly minimizing the amount of angular surface of the sleeve in contact with the flare of the tube.

With reference to Exhibit O, can you explain to the court what effect, if any, that transition area has in relation to the body of the fitting? I will hang up Exhibit O again.

A. The transition area, of course, since it is on a radius, draws away from the nose of the body, and therefore would not be considered a part of the sealing surface.

Q. And in that respect, not a part of the flare?

A. I wouldn't consider it a part of the flare.

Mr. Huebner: Your Honor, I am about through, but I would like to have a very brief conference with my partner, Mr. Beehler, before stopping.

(Short interruption.)

Q. (By Mr. Huebner): Mr. Adams, you were asked yesterday by Mr. Freeman, on page 872 of the record, the following [896] question:

“Q. Do you recall stating as a fact in your book that initially it required five times overtorqueing, whereas if it were used the second or third time, it might only be twice or three times overtroqueing to shear off the flare?”

And your answer was:

“A. No.”

(Testimony of Harold W. Adams.)

Do you wish today to modify or correct that statement?

A. Yes. I said in my book a small number of times. I had just finished running these tests, to which reference has been made, in connection with the modified sleeves, and in this test we tightened fittings from five to in some cases 55 times. I had in mind at the time I wrote the book by "a small number" somewhere in the neighborhood of 10 to 20 times. [897]

Q. Now, it was suggested to you yesterday by Mr. Freeman that the prices on the 810, two-piece fitting, were less than the prices on similar sizes of three-piece AN fittings, and I believe you testified you did not know the comparison of prices. Have you since ascertained the comparative prices?

A. Yes.

Q. What are they?

A. I now know that the price for comparable fittings is on the order of half or less for the AN fittings. The AN fitting, according to prices that we obtained about a year ago, at the time the Super DC-3 was being modified, the prices for AN fittings at that time were in the neighborhood of half of the price for the corresponding 810 fitting. These were obtained from our usual suppliers. That was the Parker Company in the case of the 810 fitting, and our usual vendors in the case of the AN fitting.

Q. I would like to ask you whether if you over-tightened a fitting having the structure of the Parker patent in suit, would that structure shown

(Testimony of Harold W. Adams.)

therein avoid a pinch-off which the Douglas improvement shown in Exhibit VV avoids?

A. No. It is necessary to have a substantial difference in angle between the countersink on the inside of the sleeve and the angle on the nose of the body in order that when the sleeve and body come into contact after pinching off the tube [898] there is still a substantial thickness of tubing remaining at the base of the flare. This requires a fairly large angle. On the order of—well, the AN fitting has an angle difference of—the difference between 37 and 181½.

Mr. Huebner: No further questions.

Recross-Examination

By Mr. Freeman:

Q. Those prices that you checked were prices of a year ago and not back in 1940?

A. A year ago.

Q. And you recognize, do you not, that the two-piece fitting has substantially become obsolete from 1940 on? A. Yes.

Q. And you recognize, further, that it is substantially out of production? A. Yes.

Q. And you recognize, further, that it can be made on a shop order?

A. Yes, it would have to have been for the Super DC-3, I should think.

Q. And you recognize, further, that starting along in 1940 and thereafter that hundreds of millions of the AN fittings were made?

A. Certainly.

(Testimony of Harold W. Adams.)

Q. Volume production? [899]

A. Certainly.

Q. And you recognize, further, that price, when the volume goes up, price goes down?

A. Certainly.

Q. And you recognize that when manufacturing falls off of a given quantity and requires special set-up, price goes up? A. Certainly.

Q. You made no comparison of prices back in 1940, did you?

A. No. You referred to the prices at the time that the Super DC-3 was being made.

Q. I also referred to the time that you made the changeover in the first place.

A. Yes. On the C-47, the Army airplane.

Q. Yes. And that was back in 1940 or '41?

A. Yes, in that neighborhood.

Q. And at that particular time they were still manufacturing the 810 in volume; correct?

A. I presume they were.

Mr. Freeman: That is all.

Mr. Huebner: No further questions.

Mr. Beehler: Will Mr. Wolfram please take the stand?

The Clerk: Is this further cross-examination?

Mr. Beehler: This is direct. [900]

The Clerk: As an adverse witness?

Mr. Freeman: He is not an officer or agent of the corporation, so he is bound by whatever he testifies to, and unless he is adverse he shouldn't ask leading questions.

JOHN N. WOLFRAM

called as a witness on behalf of the defendants, having been previously sworn, was examined and testified further as follows:

Direct Examination

By Mr. Beehler:

Q. Mr. Wolfram, I believe you stated you have been with the Parker Company 18 years or so?

A. That is correct, nearly 18 years.

Q. And that in 1932 you were directly connected with the engineering department in the preparation of drawings? A. Yes.

Q. Are you familiar with the drawings and dimensions which were used to actually manufacture the Parker fittings in the Parker Company in 1935? A. Yes, in a general way.

Q. I want to show you, Mr. Wolfram, Defendants' Exhibits comprising drawings of the Parker Company, drawing No. 2-1835, 2-1835-1, 2-1835-2. I believe those were Exhibits L, M and P. Did the Parker Company make fittings in accordance [901] with the dimensions of those drawings in 1935?

A. I think generally speaking that is correct, although these drawings are not shop manufacturing drawings as such. I think, I am not too sure about this, but I think that these drawings are more in the nature of inspection drawings where they weren't too much concerned with all of the detailed dimensions that you would use in set-up. By that

(Testimony of John N. Wolfram.)

I mean this: that there appear to be quite a number of fractional dimensions on these drawings, and I think that the shop drawings would have listed those in decimals with a closer tolerance than would be indicated by this drawing. In fact, there is no tolerance listed for the fractional dimensions on these drawings.

Q. Is it true that fittings as made by the Parker Company in 1935 would need to conform to the dimensions shown on these drawings?

A. I think that they probably would.

Q. Would that answer apply to the six size in the drawings before you?

A. I assume that they would. I am not positive, because, as I say, I am sure that these were not actual shop drawings, because the shop drawings at that time were individual sheets. [902]

Q. Would the dimensions on the shop drawings conform to the dimensions given on these drawings for corresponding sizes and corresponding portions of the parts of the fittings involved?

A. Well, I assume that they would. I am not too certain for just what reason this particular set of drawings was made. It is entirely possible that this set of drawings was made as a proposal of possibly some dimensions to be changed, because I do know that there were quite a number of changes made in the dimensions of the parts.

Q. Can you, Mr. Wolfram, before court convenes this afternoon, give us the precise dimensions for the No. 6 size on the parts given here on these

(Testimony of John N. Wolfram.)

drawings so that we may know whether or not these dimensions were the dimensions of fittings which were actually made in 1935?

A. Well, I will try, but I don't know whether I will be able to ascertain that by that time.

Q. I would like to refer you to a series of drawings which were secured by the defendants from the files of the Parker Appliance Company, this particular series being drawings related to the No. 6 size. Will you thumb through them, Mr. Wolfram, and tell me whether any of these could be used by you in checking the dimensions appearing on the drawings first referred to in order to determine exactly what the dimensions were which were used in the manufacture of fittings [903] in 1935?

A. I don't think that I could tell from these drawings, because they are all dated later than 1935, and I can't tell from them whether or not changes had been made in the shop production drawings from 1935 to the date of these drawings.

Q. Who in the Parker Appliance Company could tell us exactly what the dimensions were which were used on 6 size of the fittings made in 1935?

A. Well, I assume that someone that is connected with the engineering department at the present time that handles drawings might be able to trace that back.

Q. Will you give us the name of some individual, please, that we can rely upon?

(Testimony of John N. Wolfram.)

A. Well, I think that Leland Schmohl might be able to do that.

Q. And his address is what?

A. Well, he is in the Cleveland plant and he lives in Cleveland. I don't know his exact residential address.

Q. Will you tell us, if you know, Mr. Wolfram, what drawings should be asked for in order for us to determine precisely the dimensions of the No. 6 size fittings which were made in 1935?

A. Well, I should think that you should ask for the drawings in just about the manner you have stated, the shop [904] drawings for that particular time.

Q. Do you have such shop drawings or copies of them with you in California?

A. Not that I know of.

Mr. Freeman: If you want to introduce any of the drawings you have received from the Parker Company, it is perfectly agreeable with us.

Mr. Beehler: Those which we have introduced are the only ones which we care to introduce.

That's all, Mr. Wolfram.

Mr. Huebner: Do you have any questions?

Mr. Freeman: No.

(Witness excused.)

Mr. Huebner: Your Honor, I would like to put into the record the case which I referred to very early in the trial. I am not going to quote from it, but I want to cite it to show our position on the

point that a renewed application, such as the Parker patent in suit involves, which contained claims to additional matter over that originally allowed avoids the entire patent. The case is *In Re Kaisling*. It was in the Court of Customs and Patent Appeals, reported at 44 Fed. (2d) 863.

Earlier in the trial, I offered certain pamphlets, which were marked for identification as Exhibits F and G, and they were refused admission at that time for the purpose for which [905] they were then to be offered. Those pamphlets do, however, illustrate certain prior art fittings and have reference to them in the text, and I therefore again offer as exhibits Exhibits F and G for identification.

The Court: May I see F and G?

Mr. Huebner: I think both of them are Parker bulletins.

The Court: Do you have any objection, Mr. Freeman?

Mr. Freeman: No. If he is talking about any prior art and it happens to be a bulletin put out by the Parker Company, we will certainly let them go in.

The Court: They may be received.

(The documents referred to were received in evidence and marked Defendants' Exhibits F and G.)

Mr. Huebner: Now, your Honor, in the license agreements which have been admitted in evidence,

reference is made to the license extending to improvement patents. I have therefore selected and I am now going to offer in evidence a group of Parker improvement patents in order to complete the subject matter of the exhibit.

These patents which I will offer, each one shows on its face that it is asserted to be an improvement over Parker patent 1,893,442, and one of them is also said to be an improvement over Parker 1,977,240. The ones which I will offer are Parker 2,191,582.

The Clerk: That will be Exhibit CCC. [906]

Mr. Huebner: Parker 2,251,715.

The Clerk: Exhibit DDD.

Mr. Huebner: Parker 2,278,479.

The Clerk: Exhibit EEE.

Mr. Huebner: Parker 2,289,382.

The Clerk: FFF.

Mr. Huebner: Parker 2,290,890.

The Clerk: GGG.

Mr. Huebner: Parker 2,316,711.

The Clerk: HHH.

Mr. Huebner: Mr. Wagner, will you take the stand?

The Court: Those may be received in evidence.

(The patents referred to were received in evidence and marked Defendants' Exhibits CCC, DDD, EEE, FFF, GGG, and HHH.)

Mr. Huebner: Mr. Wagner is being called under Rule 43b.

CHARLES H. WAGNER

called as a witness on behalf of the defendants under Rule 43b, having been previously duly sworn, was examined and testified as follows:

Direct Examination

By Mr. Huebner:

Q. Mr. Wagner, I direct your attention to certain Parker drawings which I believe are not now in evidence. The [907] first one is 11-1137-2, the second one is MS 1034, and the third one is MS 1030. I call your attention to a statement in the lower right-hand corner of each of these drawings, reading as follows: "Patent Notice. The part or parts manufactured to this drawing are protected by one or more of the following United States patents: 1,619,755, 1,893,442, 2,212,183."

The first drawing which I identified illustrates a sleeve, does it not? A. Yes.

Q. And the second drawing also illustrates a sleeve? A. Yes. That is 1034.

Q. 1034. I am speaking of the order in which I referred to them. A. Yes.

Q. And the third in order referred to illustrates a nut, is that right? A. Yes.

Mr. Huebner: I would like to have these received in evidence, your Honor, in the order in which I introduced them.

The Court: They may be received. May I ask you a question?

Mr. Huebner: Yes.

(Testimony of Charles H. Wagner.)

The Court: I understood there was no patent upon the nut. [908]

Mr. Huebner: That is one of the reasons why I am offering these, your Honor. There is no patent on the nut and yet here is a patent notice. I will develop that. I also want to find out, and I want to show to the court what this earlier patent shows. We have here several questions that can be predicated upon this—— [909]

The Court: Let me see that last one, will you?

(Document handed to the court.)

The Court: They may be received in evidence.

The Clerk: III, JJJ and KKK.

(The charts referred to were marked Defendants' Exhibits III, JJJ and KKK, and were received in evidence.)

The Court: Mr. Huebner, I wonder if I would ask you a question.

Supposing it appears that the Parker Company was claiming a patent upon the nut, when in reality there was no patent in existence, would that in any way affect the patent upon the sleeve?

Mr. Huebner: It would affect their standing in court on the doctrine of unclean hands. It is a misrepresentation to the public, to our customers, to everybody who is involved. That is just one of the points involved.

The Court: Do you mean to say if they claimed a patent upon something for which they do not have a patent, that that places them in the category

(Testimony of Charles H. Wagner.)

of unclean hands as far as all the rest of the stuff they make?

Mr. Huebner: Yes, when they publish a thing like that it is a misrepresentation.

The Court: Mr. Freeman, do you agree?

Mr. Freeman: No, sir. I don't know yet whether or not [910] these prints were bound together and taken out of a complete folder, or were they individually distributed. I want to reserve any answer until I know what the facts are. It would make a lot of difference whether you take out one sheet out of forty. You have to look at them collectively. It is like reading one paragraph out of a letter.

The Court: I can understand very readily that where you claim a patent upon a nut, and you don't have a patent, that it might affect a law suit involving the nut. But where we have a law suit involving a sleeve, claiming a patent upon a nut, I don't know whether the rule goes that far or not.

Mr. Huebner: That is only one of the points. There is another one I will develop in just a moment.

The Court: All right. Excuse me for breaking in.

Mr. Freeman: I want to ask another question. Do you have a similar one like this for the body?

Mr. Huebner: I didn't locate it. We may have somewhere. I have no objection to producing it if we have it, but I don't know where it is.

Before any further questions, I will offer in evi-

(Testimony of Charles H. Wagner.)

dence a copy of the Parker patent 1,619,755, which is one of the patents referred to in the immediately preceding exhibits.

The Court: It may be received.

The Clerk: LLL. [911]

(The document referred to was marked Defendants' Exhibit LLL, and was received in evidence.)

The Court: Evidently, Mr. Huebner, Mr. Freeman would like to look at these exhibits, so I think we will take our morning recess now. We will recess until 10 minutes after eleven.

Mr. Huebner: Very well, your Honor.

(A recess was taken.)

Mr. Freeman: I think we found the missing print, your Honor.

Q. (By Mr. Huebner): I direct your attention to another Parker print, 11-1137-12, and ask that you identify that as a Parker print.

A. If it has the Parker name on it it must be a Parker print.

Q. You examine it. A. Yes.

Mr. Huebner: I offer that in evidence, your Honor.

The Court: It may be received.

The Clerk: MMM.

(The print referred to was marked Defendants' Exhibit MMM, and was received in evidence.)

(Testimony of Charles H. Wagner.)

Q. (By Mr. Huebner): Exhibit MMM illustrates and gives dimensions for a body, does it not?

A. It says Triple Coupling FT [912] Dimensions.

Q. Doesn't it illustrate the body?

A. That appears to be a body, yes.

The Court: Is the same printing upon that print relative to the patent?

Mr. Huebner: It is a little different and is even more pertinent. I will read the information.

Q. (By Mr. Huebner): I call your attention to the patent notice down in the lower right-hand corner.

“The part or parts manufactured to this drawing are protected by U. S. patent No. 1,893,442 and No. 2,212,183.”

I also call your attention to the fact that the drawing bears a notation “Issued 1-29-40, Reprinted September 26, 1942.”

The last one, your Honor, omits a reference to the Parker patent 1,619,755, but it says parts such as this body are protected by both the early patent 1,893,442 and the patent which is in suit.

Directing your attention to the other exhibits, III, JJJ and KKK, I call your attention to the dates, III issued 11-11-37, reprinted 2-11-34, JJJ issued 4-1-44, reprinted 9-20-44——

A. That was issued in '41.

Q. Issued in 1941 and reprinted in 1944, and KKK was issued on November 11, 1937, and reprinted January 15, 1946. So far as you know are

(Testimony of Charles H. Wagner.)

those dates which appear on the drawings [913] the dates upon which respectively those drawings were issued and then reprinted?

A. If they appear on there, I would assume that those are the dates that they were reissued and reprinted.

Mr. Freeman: I don't question any of the dates appearing on them, or any of the data thereon. They were taken from our files, and we will concede that whatever they show they show.

Mr. Huebner: With that in mind, your Honor, I will refer to the second purpose for which these drawings are introduced, and that is to substantiate our allegation in the counter-claim that there has been a controversy between the plaintiff and the defendants here as to possible infringement of certain other patents, including specifically 1,893,442, there being in these drawings a representation to the public that certain parts are covered by this other patent which is one that we referred to in the counterclaim.

The Court: Now, Mr. Huebner, may I ask you a question? When you say "controversy," have you ever had any argument with the Parker Company relative to these drawings, or these patents, or is it just a controversy in name only?

Mr. Huebner: No; we have had notification from the Parker Company that they own the patent in suit and certain other patents without specific name in the correspondence.

The Court: Did they ever notify you that they owned the [914] patent upon the nut?

(Testimony of Charles H. Wagner.)

Mr. Huebner: Not in that language, no, your Honor.

The Court: Well, the only controversy, then, is that printing appeared upon these prints in which they claimed that they were covered by the patents?

Mr. Huebner: No, there is a little more than that. There is further controversy in that the patent in suit says that it is an improvement upon two earlier patents, including 1,893,442. And ordinarily an improvement is considered to be dominated by an earlier presumably broader patent. That is one point in addition. Furthermore, the licenses which are in evidence and which have been granted to Weatherhead and the two local concerns, they also include not only the patent in suit, but additional patents, including 1,893,442; so that if you take the whole picture together you have the Parker Company representing to the public, to us as defendants, to everybody who may have any interest whatever, that they have these patents, including 1,893,442, and that that particular patent, as well as others, is infringed by certain fitting structures that we have been manufacturing. [915]

Q. (By Mr. Huebner): Mr. Wagner, were you present in court on the first day of the trial when Mr. Freeman, attorney for Parker Appliance, made the following statement on page 34 of the record:

“I am very happy to make that statement now, that we do not charge them——”

And he was referring to the two defendants here,

(Testimony of Charles H. Wagner.)

“do not charge them to have infringed or that they are infringing, and we will not assert either of those two patents set up in your counterclaim from now on out. You are as free as all outdoors to do as you want.

“Mr. Huebner: Against the defendants?

“Mr. Freeman: The defendants and their customers. You can go as far as you want.”

Did you hear that statement by your counsel?

A. Yes.

Q. And as an officer of the Parker Appliance Company, do you at this time ratify and confirm that admission and that stipulation?

Mr. Freeman: I think that is absolutely immaterial. As far as I am concerned, I stand here representing Parker, and any statement that I make Parker is bound by.

The Court: That is my understanding.

Mr. Freeman: I think we are wasting a lot of time on [916] nothing.

The Court: That is my understanding.

Mr. Freeman: I am an officer of this court and I represent the Parker Company and I speak for Parker.

The Court: He represents the company and he speaks for his client, and his stipulation in court is certainly binding in this court.

Mr. Huebner: If that is so, your Honor, I will accept it with that, but I ran across a case or two where the client wouldn't ratify what counsel had

(Testimony of Charles H. Wagner.)

done, and there was quite a bit of trouble afterwards.

The Court: We can clear it up. Is there any dispute between you and your counsel in regard to this matter?

The Witness: None, your Honor.

The Court: All right.

Mr. Huebner: That's all.

Mr. Freeman: That's all. Well, I am going to ask one question, Mr. Huebner. I would like to have you tell the court where these four prints that you have introduced, comprising two prints of two different sleeves and a print of a nut and a print of a body, came from. Were they taken from a book? They appear to be from a looseleaf book.

Mr. Huebner: I will refer to Mr. Beehler, who first obtained these drawings. Do you know, Mr. Beehler?

Mr. Beehler: Those were among the drawings which were [917] secured from the Parker Company upon an examination of their files on a court order. Where else the drawings may appear, I do not know.

Mr. Freeman: Is there any one of the defendants who has ever seen any of these drawings other than in the Parker Company files at Cleveland, Ohio?

Mr. Huebner: Mr. Masters says he has, so if you want to call him, or if there is any question about it——

(Testimony of Charles H. Wagner.)

Mr. Freeman: I just want to know where these drawings originated from.

The Court: I think it might be very important, Mr. Huebner. Supposing they claimed a patent, but they never published it? You will have to show, I think, it was published in some way.

Mr. Huebner: May I then ask Mr. Wagner two or three other questions?

The Court: Yes.

Q. (By Mr. Huebner): Mr. Wagner, these drawings before you, Exhibits III, JJJ, KKK, and MMM, do you know for what purpose they were prepared by the Parker Company?

A. As far as I know, Mr. Huebner, those were dimensional sheets that were put out in our shop in sets for manufacture of our product in Cleveland.

Q. Aren't they also inspection sheets?

A. That I don't know of my own knowledge. I must say, [918] as far as I know, they were called dimension sheets. They were racked up in part of the machines, sets of them, so that the machinists could make the fittings.

The Court: May I ask a question? Do you know whether or not any of these prints were ever given to any outsiders?

The Witness: Of my own knowledge, no, your Honor. They were not meant for publication outside, but I don't know whether they went to other people or not.

Q. (By Mr. Huebner): Isn't it true that dupli-

(Testimony of Charles H. Wagner.)

ates of these sheets were sent to outsiders for inspection purposes, and also to aid them in manufacturing the parts illustrated?

A. I don't believe so, Mr. Huebner. Of my own knowledge, I don't know, but I would say this, I would imagine, knowing my former president, Mr. Parker, who just didn't like to have drawings out, we probably had a different set for subcontractor inspection purposes. However, that has never been my particular prerogative in the company, and I just don't know.

Q. Then of whom may we inquire who would know the facts?

A. Oh, I imagine Mr. Lee Schmohl of Cleveland might know whether they were sent out or not.

Q. That is the same gentleman referred to a while ago? [919] A. Yes.

Q. And he is the only one you know of who could give us that information?

A. I think so at the present time, Mr. Huebner.

Q. Is there no one in your Los Angeles, California, office who would have that information?

A. No.

Mr. Huebner: That's all for the moment. We may ask you before court adjourns if you will contact Mr. Schmohl, but for the present we will not make such a request. There are no other questions at this time.

Mr. Freeman: That's all. Do the defendants rest?

Mr. Huebner: No.

The Court: That's all for this witness.

(Witness excused.)

Mr. Beehler: Mr. Masters, will you again take the stand, please?

IRVIN W. MASTERS

recalled as a witness on behalf of the defendants, having been previously duly sworn, resumed the stand and testified further as follows:

Direct Examination

By Mr. Beehler:

Q. Mr. Masters, I believe you on Saturday, May 7, in company with your counsel, visited the offices of the Parker [920] Appliance Company and there examined files of drawings. Is that correct?

A. That's right.

Q. What were the drawings that you asked to have given to you for examination?

A. We requested the drawings that were set forth in the court order to the Parker Appliance Company, namely, sets of drawings consisting of the body, the nut, and the sleeve, for various sizes that were manufactured in commercial quantities at different dates from 1930 down to that date.

Q. What were the particular sizes that you examined?

A. We took particular note of the four size, the six size, the eight size, and the 12 size sleeves and nuts and bodies. We obtained some drawings of other sizes, but the six, eight, and 12 sizes were particularly noted.

(Testimony of Irvin W. Masters.)

Q. Among the drawings which you examined, what drawings did you find which indicated the dimensions of the body, nut, and sleeve of the Parker three-piece fittings which were made in 1935?

A. The drawings which we obtained referred to as working drawings or shop drawings, being drawings of a single part in a single size, had all been changed many times and brought down to date, so it was necessary for us to have the tabulated charts of a particular date to ascertain the dimensions used on those dates, and in 1935, drawings 2-1835, drawing [921] 2-1835-1, and drawing 2-1835-2, were offered us as showing the dimensions employed in making the fittings in 1935.

That rendered it unnecessary for us to dig back through the change notices to ferret out the original dimensions.

Q. Were there any drawings other than those that you mentioned which were among the drawings shown to you which would show the dimensions of the body, nut, and sleeve as manufactured in 1935, or were those the only ones?

A. Those just mentioned are the only ones that I now recall. The others were working drawings which had been changed and brought down to [922] date.

Q. And you examined all of the drawings which were shown to you in those sizes that you mentioned, is that correct? A. I did, yes.

Q. Now, referring, Mr. Masters, to the other

(Testimony of Irvin W. Masters.)

drawings presented a few moments ago, Exhibits III, JJJ, KKK and MMM, did you at any time, outside of the Parker Appliance Company, see drawings like that?

A. Yes, I saw drawings like that not of that particular date, but they were charts showing the dimensions of the body and nut and the sleeve, a chart showing all of the dimensions of the body, one drawing, and another drawing showing all the dimensions of the different sizes of sleeves, and another chart showing all the dimensions of the different sizes of nuts. The first ones that I saw were those given to the Flex-O-Tube Company in 1938, '39 and '40.

Q. You were working for the Flex-O-Tube Company then?

A. That's right. And there were many discussions about negotiation of a license agreement. Flex-O-Tube Company was making hose assemblies with this type of fitting on the end, and anticipating such an agreement, which was never consummated, the drawings were supplied to Flex-O-Tube Company.

Q. Were drawings corresponding to those supplied to anybody else that you know? [923]

A. Yes.

The Court: May I ask the witness a question at this point? On these drawings did you notice whether there was anything said about the drawings being covered by a patent?

The Witness: Yes, your Honor, I recall that distinctly, and I believe that I have, maybe, in this

(Testimony of Irvin W. Masters.)

court room such a drawing in my possession. I do at my shop if I don't have it here.

Answering your question, Mr. Beehler, I couldn't testify definitely as to whom else they were supplied to. I saw them at the industry conferences at Dayton during the war.

Q. (By Mr. Beehler): That was about what year? A. 1943, '44, I believe.

If I may further respond to the judge's question. Mr. Lyon's whispering out here set me off.

Those would not be the same notations, of course, in '39 because some of those patents, the last patent mentioned was not yet issued.

Mr. Freeman: That is, the patent in suit had not yet issued?

The Witness: That's right.

The Court: But you do remember that there was something on the drawings which indicated that the subject-matter was covered by a patent?

The Witness: Yes, I do. [924]

I think in a few minutes I can produce it.

Mr. Beehler: That is all, Mr. Masters. The defendant rests. Excuse me, Mr. Freeman. You may have the witness.

Cross-Examination

By Mr. Freeman:

Q. Mr. Masters, just so the record is straight, you don't recall the detailed wording of any of the **wording that you saw at the Flex-O-Glass Company?** A. Flex-O-Tube?

(Testimony of Irvin W. Masters.)

Q. Yes.

A. Except that general statement that parts therein described are covered by patents No. Umpty-ump, whatever it was.

Q. Were those prints in a folder or were they in book form, or were they separate sheets, or do you recall?

A. They were mailed to us as charts.

Q. Single charts or multiple charts?

A. We were principally interested in two things, the shape and size of the dimensions of the sleeve and the nut, because we were putting swivel assemblies on the end of hoses.

Q. When was that negotiation carried on?

A. Well, I believe that that was—let me refresh my memory from the letter here. I have here a copy of one letter to Flex-O-Tube Company, December 2, 1938, and I just [925] noted in my files the other day a letter from Mr. Bigelow in 1940 after I came to the Coast—I came to the Coast in November of '39—and Bigelow supplied me some drawings subsequent to that.

Q. So that your negotiations, or at least the Flex-O-Tube Company, was carried on prior to the filing of the present Parker patent in suit?

A. No. I think that filing was——

Q. I think you said January, 1938.

A. December, '38.

Q. The patent was filed March 2, 1938. Do you recall whether or not in the charts there was any

(Testimony of Irvin W. Masters.)

representation of the angle on the sleeve, outside angle on the sleeve?

A. No, I don't recall that.

Q. Do you know as a fact that the angle on the sleeve was incorporated sometime after December of 1939? A. That's right.

Q. Mr. Masters, it is not at all unusual to make changes in drawings from time to time, that is, production drawings? A. Oh, no.

Q. That is standard practice?

A. That's right.

Q. When they make a change they just make a little notation with a change-order to show that the change has been [926] made as of a given date?

A. That's right.

Q. So that a drawing that may bear the date 1938 may have features incorporated therein as late as, say, 1942 or '44, if the print is made after 1944?

A. I am sorry, I don't quite follow that.

Q. In other words, the original date of the making of a drawing is not the determining date when that specific drawing was actually put out, if it has a change-order with the date of the change-order subsequent to the original date on the drawing? Do you follow me?

A. Well, I think I do, but let me state that drawings customarily carry the original date of issue, and any changes, if any, are indicated on the drawing. It may be change A, B, C, D, or numbered, or simply the dates of the change. And if I understand your question correctly, the condition of the

(Testimony of Irvin W. Masters.)

drawing as you look at it with the changes may not be the original condition of the drawing.

Mr. Freeman: That is all.

Redirect Examination

By Mr. Beehler:

Q. Mr. Masters, I refer you to Defendants' Exhibits I, J, and K, drawings No. 811T, 811BT and 811FT, and ask you whether or not drawings of that kind were found by you in general [927] circulation? A. Yes.

Q. Where did you see such drawings?

A. I believe that I did not see such drawings as this until the middle of the war, possibly '43, and at the various meetings at Dayton when I first saw them.

Q. Did you see them elsewhere, too, besides in Dayton?

A. Well, a set was obtained by us in connection with those meetings, and then we ran into some dimensional conflicts, and we were advised to get a set of drawings directly from Parker, and I requested them of Mr. Amon, and he forwarded them to me.

Q. And those were drawings like those which you now hold in your hand?

A. That is correct.

Q. And those are drawings like Defendants' Exhibits I, J and K?

(Testimony of Irvin W. Masters.)

A. Well, I don't recognize those exhibits numbers. These that you just handed to me.

Q. For the record, those are the numbers of the exhibits you hold in your hand?

A. They are.

The Court: I notice on some of the exhibits for the nut, the body, and the sleeve, that they also have: protected by U. S. letters patent numbers so-and-so.

Mr. Beehler: That, your Honor, was the purpose of [928] calling attention to the general distribution of these drawings.

The Court: This patent No. 1,893,442, which one is that?

Mr. Beehler: That is one of the patents which was set forth in the counter-claim.

No further questions.

Recross-Examination

By Mr. Freeman:

Q. When you received those drawings, you received them in the form of a set, that is, the nut, body and sleeve; correct?

A. I believe so, along with other drawings.

Q. But my question was, you received the three drawings that have just been referred to in the form of a set comprising a nut, body, and sleeve, is that right?

A. I believe that is correct, Mr. Freeman.

Mr. Freeman: That is all. [929]

Mr. Beehler: The defendant rests, except reserving the right to introduce such additional drawings as we may find pertinent to this discussion before the case closes.

The Court: Mr. Freeman, how much time are you going to require now to complete your case?

Mr. Freeman: I am not going to take very much time. We have three rather short outside witnesses, and we have a little of rebuttal on the part of Mr. Wolfram.

The Court: Will there be any question about cleaning it up this afternoon?

Mr. Freeman: I think we can almost clean up this afternoon, your Honor. I almost hesitate to say this, but I think we can push it. We can clean up one witness before lunch. He is here available.

The Court: Call your witness.

Mr. Freeman: Mr. Murphy.

FRANK MURPHY

called as a witness in rebuttal on behalf of the plaintiff, being first duly sworn, was examined and testified as follows:

The Clerk: Your name, please?

The Witness: Frank Murphy.

Direct Examination

By Mr. Freeman:

Q. Mr. Murphy, you are employed by the Douglas [930] Aircraft Corporation of Santa Monica, California? A. That is right.

(Testimony of Frank Murphy.)

Q. That is the same company by whom Harold Adams is employed? A. Correct.

Q. I understand that you are in the hydraulics and landing gear section as an engineer.

A. That is correct.

Q. Will you tell us when you first entered the employ of Douglas? A. In 1933.

Q. You are a graduate aeronautical engineer?

A. Yes.

Q. From what school did you graduate?

A. University of Minnesota.

Q. When you first entered the employ of Douglas, what were your duties?

A. You mean when I first entered Douglas?

Q. Yes.

A. I worked at various things. I worked in blueprints, went to material release, and I spent a year and a half going through shop training, through the school engineering training.

Q. In other words, adapting yourself for the work that was to follow? [931]

A. That's right.

Q. When did you get into the hydraulics section as an engineer at Douglas?

A. Oh, I would say about, I don't know exactly, '37, '38, probably around '38.

Q. Since that time, have you gone along in the hydraulics section?

A. I have been there ever since, yes.

Q. I take it that in hydraulics you have worked

(Testimony of Frank Murphy.)

on landing gear and on mechanisms that are hydraulically operated? A. Correct.

Q. Are you familiar with fittings?

A. Yes.

Q. Tube couplings?

A. Tube couplings, yes.

Q. When you first entered the employ of Douglas, do you recall the type or kind of fitting that was then used?

A. The first fittings we were using at that time were 810 type fittings.

Q. That is the two-piece type?

A. The two-piece type, yes.

Q. Do you recall about when Douglas went over to the three-piece type?

A. Well, we went over on the C-47's. I don't know [932] whether they changed on the later B-18's or not, but I know on the C-47's we converted to the triple type.

Q. At that time you went over to the 811?

A. We went over to the 811 on the C-47's.

Q. And that is a three-piece fitting?

A. That is a three-piece fitting.

Q. Are you familiar with the present AN fitting? A. Yes.

Q. And are you familiar with the outside angle on the sleeve?

A. Yes, the tapered angle on the sleeve.

Q. You say the tapered angle on the sleeve. You have reference to the inclined wall portion of the sleeve itself; correct? A. That is right.

(Testimony of Frank Murphy.)

Q. And you are now looking at Defendants' Exhibit O? A. Yes.

Q. In that particular case, the space between the sleeve and the nut within the region or closely adjacent the region of shoulder contact between the nut and the sleeve is in closer relationship than at the toe of the sleeve and nut; correct?

A. Correct.

Q. In your opinion as a hydraulics engineer working in that particular field, does that angle provide any [933] advantage to the overall coupling?

A. Well, performancewise, I think it does, in that it gives you a better chance for disengagement of the nut from the sleeve when you are uncoupling, so you can take advantage of the triple type connection.

Q. In other words, there is less likelihood of the sleeve jamming in the nut?

A. There is less likelihood of the nut and the sleeve jamming together and becoming one unit and having to be removed and pushed back together.

Q. Is that a disadvantage, to have to remove the two parts together?

A. Yes, it is a disadvantage and it has been a requirement actually that they should be able to be disengaged together so you can inspect underneath the sleeve and underneath the nut.

Q. In other words, it is desirable that they can be disengaged or spaced apart so that you can visually inspect both the sleeve and the nut?

(Testimony of Frank Murphy.)

A. On disengagement, yes.

Q. And I understand in actual installation, you do assemble and disassemble the couplings many times?

A. Normally, yes, you would disassemble a number of times, depending on the number of times you would remove units. Some particular couplings at a particular point in [934] the system may be assembled once and stay that way, but in other parts of the system, you might pull it down quite a number of times.

Q. And in the provision of the outside sleeve angle, the lower end or the nose end of the sleeve may expand a greater distance without necessarily galling or coming in contact with the nut; correct?

A. Well, naturally by design it would have to expand more before it locked into the nut.

Q. So that there is room for the necessary expansion without necessarily galling or binding on the nut?

A. Well, I think it is more so that when you take the load itself it tends to flare it back against the nut as a back-up so it will provide disengagement, so it will disengage over the threads without locking in the threads.

Q. So when you disengage the nut and remove the parts, the sleeve will then, let us say, collapse or move inwards?

A. That's right. It will move inwardly to its original position provided you have not exceeded

(Testimony of Frank Murphy.)

the yield point of the materials so they are stretched beyond the elastic limit.

Q. So, initially, the sleeve expands somewhat to bring about a proper seal? A. Yes.

Q. And yet when you remove the nut, it springs back, [935] using that expression?

A. Provided you haven't exceeded the elastic limit of the material so it has taken a permanent set.

Q. In so doing, then, you can remove the nut without necessarily engaging or pulling the sleeve along with it? A. Yes.

Q. And that is the type of fitting now used by Douglas?

A. At the present time we are using the AN type as shown here.

Mr. Freeman: That's all. You may cross-examine.

Cross-Examination

By Mr. Beehler:

Q. Mr. Murphy, what advantage is there in a sleeve having an outside sleeve head and angle of the type shown there in Exhibit O over a sleeve which would have a cylindrical outside and sufficient clearance to clear the inside of the nut?

A. The main advantage to this, as far as I can see, is for disengagement and it does give you an entry angle to clear your threads. We have had cases where threads have run down even further

(Testimony of Frank Murphy.)

than shown in this illustration, where they haven't necessarily stopped before the sleeve comes down there, and have the sleeve Brinell into the threads, and you couldn't get the sleeve out at all.

Q. Wouldn't you have the same advantage if you had a [936] cylindrical exterior on the sleeve and the same clearance as you had at the toe end of the sleeve head?

A. It depends on the amount of clearance you can have and how much you want the nut to back up the sleeve when you load it up. In other words, if you have too much clearance, the sleeve will take all the load when you torque it up.

Q. Supposing you had just as much clearance on a cylindrical sleeve as on that one before you, Exhibit O, at the place where the clearance is greatest?

A. As shown here all the way along?

Q. Yes.

A. It is possible it would work, but I think it would be more desirable to have the clearance angle or chamfer angle to provide for pulling back the nut.

Q. How would the angle provide that in a way which the straight cylindrical exterior would not?

A. Well, because a burr is being thrown up, and it gives you more of a chance to pull it back than if you wouldn't have the clearance angle.

Q. The burring is being thrown out where?

A. On threads and all the fitting on down.

Q. Do you not have the same clearance in each event?

(Testimony of Frank Murphy.)

A. No, because this will give you more clearance on the entry point to pull back the [937] combination.

Q. Assuming on a cylindrical exterior we have just as much clearance throughout the entire length.

A. Actually, you can design it, if you want to, so you have a great deal more clearance than here the whole way, and then the sleeve will take the whole load, but if you have too much, the sleeve will take all of it and the nut will not take the radial expansion load due to your torquing together with the tensile stress.

Q. Does the nut take some of the radial expansion? A. Yes.

Q. How do you know that?

A. The sleeve will expand and be backed up by the nut. [938]

Q. Did you ever examine a made-up fitting to determine whether or not that was true?

A. I am sure we have had cut-aways made which showed that.

Q. Did you ever examine it and measure it, yourself?

A. Well, I never measured it. I am sure you have metal-to-metal contact.

Q. Are you assuming that, or do you know that to be true from your own observation?

A. I would say it would be true from my own observation in the past.

Q. How did you determine that?

A. Visually on cut sections.

(Testimony of Frank Murphy.)

Q. On cut sections? A. Yes.

Q. Is there any hoop tension in the sleeve head on a cut section?

A. We had them torqued up, I would say out there, and I am sure we have tension in the nut. We have had nuts split on us where you overtorque them too much.

Q. How can you have hoop tension in a sleeve head if it was cut away in section?

A. Well, I think the material is being held where it was originally held.

Q. What holds it? What would hold it? [939]

A. Friction.

Q. Friction between what parts?

A. The threads where you have tightened them down on the fitting.

Q. How would that hold tension in the sleeve head?

A. Well, you have jammed your parts down in there, and actually you haven't relieved that part to let it go back up. Actually when you cut your section this part is pulled down (indicating), this is expanded (indicating), and as long as you don't relieve it out by loosening it, it is still being held out in the same place.

Q. What is hoop tension?

A. What is hoop tension?

Q. Yes.

A. Circumferential stress, I would say.

Q. Where do you get circumferential stress in a section of fitting?

(Testimony of Frank Murphy.)

A. By the wedge action as you tighten down on the fitting.

Q. Don't you destroy the circumference when you cut the fitting in half?

A. Yes, but you are still holding it down there and you have expanded it out there.

Q. In your reference, Mr. Murphy, to the expansion of the sleeve head, on your examination of cut sections, is it [940] your observation that the sleeve head expands into contact with the inside of the nut throughout its length?

A. I don't know if it is all throughout its length or not. I am sure the sleeve expands out to the nut.

Mr. Beehler: That is all.

Mr. Freeman: No further redirect.

The Court: We will recess now until 2:00 o'clock.

(Whereupon, at 11:55 o'clock a.m. a recess was taken to 2:00 o'clock p.m. of the same [941] day.)

July 6, 1950—2:00 P.M.

The Clerk: Cause on trial.

Mr. Beehler: Mr. Freeman, I wonder if it wouldn't be better to reopen momentarily for the introduction of two documents which we found over the noon hour?

Mr. Freeman: Proceed.

Mr. Beehler: I will put Mr. Masters on the stand.

IRVIN W. MASTERS

recalled as a witness on behalf of the defendants, being previously duly sworn, resumed the stand and testified further as follows:

Direct Examination

By Mr. Beehler:

Q. Mr. Masters, I show you a document which we will mark Defendants' exhibit next in order, patent drawing No. 11-1138, and bearing the notation in the title block, "Copy No. 44, Issued 11/11/37; name Std. Triple Coupling Ft. Dim."

The Clerk: This will be marked NNN for identification.

(The document referred to was marked Defendants' Exhibit NNN for identification.)

Q. (By Mr. Beehler): Will you tell us, Mr. Masters, where you secured that drawing?

A. I obtained this drawing from the Flex-O-Tube Company [942] at the time I took over their fitting manufacturing obligations. They received it some time in 1939 from the Parker Appliance Company.

Q. Do you recall the circumstances under which they received the drawing at that time?

A. Yes. They were manufacturing hose assemblies with these details on the end, and also were manufacturing fittings with these details to use as adapters.

(Testimony of Irvin W. Masters.)

Q. How was it you personally came into possession of the drawing?

A. The Flex-O-Tube Company turned it over to me by reason of my picking up their obligations to manufacture fittings which they couldn't take care of because they were swamped with other orders, and I started manufacturing fittings out here.

Q. That was about when?

A. That was in 1941.

Mr. Beehler: I offer in evidence as defendants' exhibit NNN the drawing just identified.

The Court: It may be received.

(The document referred to was received in evidence as Defendants' Exhibit NNN.)

Q. (By Mr. Beehler): I show you now, Mr. Masters, a photostat of another drawing, and unfortunately I have only one copy here, bearing notation in the title block, "Size A. [943] Drawing No. 12-1133-3, Revision M," and noted as Engineering Department No. 6T, which I request be marked for identification defendants' exhibit next in order.

The Clerk: OOO for identification.

(The document referred to was marked Defendants' Exhibit OOO for identification.)

Q. (By Mr. Beehler): Do you recall the circumstances under which you received this particular drawing?

A. That was one of the drawings given to us by the Parker Appliance Company when we were at their place on May 7th last year, 1949.

(Testimony of Irvin W. Masters.)

Mr. Beehler: I offer in evidence as Defendants' Exhibit OOO the drawing just referred to and marked for identification.

The Court: It may be received.

(The document referred to was received in evidence as Defendants' Exhibit OOO.)

Mr. Beehler: That's all.

The Court: The defendants rest now?

Mr. Beehler: Yes.

Mr. Freeman: I am going to ask him a question.

Cross-Examination

By Mr. Freeman:

Q. The marking upon Defendants' Exhibit NNN includes a phrase that the print is not to be used for manufacture or [944] reproduction in quantity of the articles or parts disclosed in the print. That is correct, is it not?

A. That is what it says on the print.

Q. And, further, that the print was not to be disclosed to anyone other than an official of the United States government; correct?

A. That is what it says on the print.

Mr. Freeman: That's all. [945]

The Court: Now I assume that we can officially say that the defendant rests?

Mr. Freeman: They have already rested, because Mr. Murphy, who testified just before lunch, was our witness.

Mr. Hosterman, please.

FRED HOSTERMAN

called as a witness by and on behalf of the plaintiff, having been first duly sworn, was examined and testified, in rebuttal, as follows:

The Clerk: State your name, please.

The Witness: Fred Hosterman.

Direct Examination

By Mr. Freeman:

Q. Where do you reside, Mr. Hosterman?

A. Burbank, California.

Q. By whom are you employed?

A. Lockheed Aircraft Corporation.

Q. How long have you been with Lockheed?

A. Since October, 1936.

Q. In what capacity are you presently employed by Lockheed?

A. As a design specialist on hydraulics.

Q. How far back does your hydraulics work go with Lockheed? [946]

A. Early in 1937.

Q. Since that time you have continuously devoted your attention to hydraulics engineering and design?

A. That is correct.

Q. And you went through the hydraulics, engineering and design, all through the war period?

A. Yes, sir.

Q. Are you a graduate aeronautical engineer?

A. Yes, sir, I am.

Q. Of what school?

A. Parks Air College.

Q. That is in East St. Louis?

A. That is correct.

(Testimony of Fred Hosterman.)

Q. You obtained a Bachelor of Science degree in aeronautical engineering? A. Yes.

Q. And Parks College now is part of the St. Louis University? A. That's right.

Q. Can you tell us briefly the uses of hydraulic systems in connection with aircraft? What do they do? What do they perform?

A. Well, hydraulic systems are used as a means of power transmission primarily. That is, they transmit power from some prime mover such as the engine or an electric motor [947] to some mechanism which must be moved under power, such as a landing gear, wing flaps, control surfaces, bombay doors.

Q. Bombay doors, that is part of Army aircraft or Navy aircraft? A. Military aircraft.

Q. When we talk about a hydraulic system for operating bombay doors, does that mean that the doors are controlled from a remote position with respect to the doors themselves?

A. Yes, that's right.

Q. Does that mean that fluid under high pressure is transmitted through tubes from the place of control to the place of operation?

A. That is right.

Q. Do they employ or do you employ fittings for connecting the tubes together or the tubes to the instrumentalities which are operated?

A. We do.

Q. And when you came with the Lockheed Com-

(Testimony of Fred Hosterman.)

pany and entered the hydraulics section of that company what fittings were then used?

A. The 810, two-piece type.

Q. Did your company continue to use the 810, two-piece type, for any great length of time?

A. No; we discontinued the use of the two-piece type fitting on new designs some time during 1937. [948]

Q. And was that upon any government or air force requirement?

A. No; that was done on commercial aircraft, on our own volition.

Q. Was that done because of a better fitting being provided?

A. Yes, we considered the three-piece fitting to be far superior to the two-piece.

Q. Are you familiar with the 811 fitting?

A. Yes, I am.

Q. When you went initially to the three-piece, 811 fitting, the sleeve therein had a wall parallel to the wall of the nut; correct?

A. That is right.

Q. Was that sleeve later on changed in the 811 fitting?

A. Yes, it was changed later to have an angle.

Q. In other words, when you say "have an angle," that is an angle somewhat as is illustrated in the chart that is hanging here in the court room, Defendants' Exhibit O?

A. That is right.

Q. I am going to ask you, your company manufactures a commercial plane under the trade name

(Testimony of Fred Hosterman.)

of Constellation; correct? A. That is right.

Q. And I take it you use fittings in that particular [949] plane? A. That is right.

Q. What kind of fittings do you use?

A. We use the basic 811 type fitting in that airplane.

Q. How about the sleeve?

A. The sleeve is the AN sleeve.

Q. So that we get our period of time correct, initially when you started manufacture of the Constellation you used the 811 fitting?

A. That is correct, that was before the AN fitting was adopted.

Q. When the 811 fitting was changed from a straight wall or a parallel wall sleeve to an inclined wall sleeve, did you then use the 811 fitting with the sleeve having the tapered wall or inclined wall?

A. I can't say definitely when we changed from the straight wall type to the tapered wall type. I am not sure whether that occurred on the Constellation first, or not.

Q. You are certain, though, as of now, that your present fittings used on the Constellation do include the tapered wall on the sleeve?

A. That is right.

Q. Are there any advantages in use of a three-piece fitting over and above a two-piece [950] fitting?

A. Yes, there are quite a number of advantages. First, the three-piece fitting tends to eliminate

(Testimony of Fred Hosterman.)

the shearing action which occurs on the two-piece fitting between the two parts of the fitting when the assembly is made. Secondly, the three-piece fitting has much less engagement between the tube and the body of the fitting, which is a great help in assembly of the tube into the airplane. Also, we are able to make bends closer to the fitting because the nut can slide back around the bend, whereas in the straight fitting in order to disengage it, in the two-piece fitting, in order to disengage it, it is necessary to have a straight section of tube in order to slide the nut in that case back from the body of the fitting. [951]

Q. Are fittings used in what we might call close quarters in airplanes?

A. That is true, particularly in small fighter types, we are very cramped for space, and ease of installation is a great advantage.

Q. Are there a great number of fittings used in the common airplane?

A. Yes, a very large number.

Q. Do they run into the hundreds or may I say even thousands?

A. I have never counted them, but I know you are safe in saying hundreds.

Q. Is there any advantage in the removability of the nut or in engaging or disengaging the parts by providing a sleeve angle on the outside surface of the sleeve head?

A. Yes, there is an advantage. It is very necessary that we be able to slide the nut back along the

(Testimony of Fred Hosterman.)

sleeve when we disengage the fitting. That is one of the advantages which I cited for the three-piece fitting.

Q. Is there any advantage in permitting the nose end of the sleeve to expand a greater distance and yet remain out of contact with the wall of the nut?

A. Yes. That is important for two reasons, which are in a sense related. First, to permit the sleeve to expand, which it must, due to the wedging action, without binding the [952] nut. Also, by having that clearance for expansion, the full torque which is applied to the nut can be better translated into axial force, and therefore achieve a better sealing contact.

Q. Is there any advantage in the nut backing up the sleeve after there has been a certain amount of torque applied?

A. Yes, that is an advantage, because the sleeve definitely does deflect due to the wedging action of the conical surfaces, and it is necessary to have additional support to take the load off of the sleeve.

Q. And that additional load is the backing up of the nut, that is, the nut backing up the sleeve closely adjacent the portion of the nut which engages the shoulder on the sleeve; correct?

A. Yes.

Q. That portion has been referred to as region of contact, and we are both agreed that is the portion between the flange of the nut and the shoulder on the sleeve; correct?

(Testimony of Fred Hosterman.)

A. That is the primary region of contact, yes.

Q. If you didn't have that backing up, might you have a great number of sleeve failures brought about by cracking or over-expanding of the sleeve?

A. I would say that is quite probable.

Q. What has your practice been at the Lockheed plant [953] with sleeves cracking, using the type of sleeve wherein there is the tapered or inclined wall?

A. We have had some cases of sleeve cracking.

Q. But, generally speaking, it hasn't been out of proportion? A. No. That is true.

Q. And do fittings serve an important function; are they required to do a job?

A. Yes, they are certainly one of the most important parts of a hydraulic system.

Q. And when you say the most important part of a hydraulic system, is that because if you happen to have a leaky fitting, you have no hydraulic system? A. That is correct.

Q. And would you say that the angle on the sleeve enables you to over-torque without bringing about a disastrous condition or failure of the fitting?

A. I would say that the angle on the sleeve permits you to use an increased amount of torque as compared with the amount you would be able to apply without the taper on the outside of the sleeve.

Q. And even though you use some increased amount of torque, you can still back the nut away,

(Testimony of Fred Hosterman.)

which is a requirement for service and checking of parts; correct? A. That is correct. [954]

Mr. Freeman: You may cross-examine.

Cross-Examination

By Mr. Beehler:

Q. Mr. Hosterman, you were asked the question about the backing up of the sleeve by the nut. I wonder if you would explain again just what you mean by the backing up of the sleeve by the nut?

A. Well, I think I can best explain that by again using my analogy to a wedge. The nut transfers an axial load to the sleeve and the tube. The taper section of the fitting and sleeve acts as a wedge, which expands the sleeve radially. That expansion is more pronounced at the toe of the sleeve or flare assembly, and that expansion deflects that portion outwardly until if enough torque is applied it will contact the inside diameter of the nut at that point.

Q. Then the backing up that you refer to as taking place in a sleeve, nut, and body assembly of the AN type, takes place at what point with relation to the head of the sleeve?

A. That will depend upon the amount of torque which is applied.

Q. Assume the recommended torque, let us say.

A. I would say that in all probability in most cases the first contact would probably occur at this point (indicating), even though there is an initial clearance there. [955]

(Testimony of Fred Hosterman.)

Q. You mean by "first contact," first contact of the sleeve head with the cylindrical wall of the nut, is that correct?

A. That is correct, due to deflection of the sleeve.

Q. And then you think there might be a later contact, is that true, somewhere else along the sleeve head?

A. Depending upon the amount of torque applied, it would in all probability deflect to the point it would contact along the whole surface. However, that is an extremely over-torqued condition.

Q. Have you ever made any physical measurements of expanded fittings to determine, let us say, what the expansion of the sleeve head might be?

A. I have not made any physical measurements. However, we have taken partial sections of assemblies in which we have noted that condition, that deflection that I spoke of.

Q. Namely, that the deflection is first apparent nearest the nose of the sleeve head?

A. That is correct. That is more pronounced on the 811 sleeve than on the AN, due to the fact that the 811 sleeve has a shorter flange section.

Q. You mentioned in response to Mr. Freeman's questioning that there was an advantage in ease of removability because of the presence of a sleeve head angle, is that correct?

A. That is right. [956]

Q. Assuming, in the case of assembly of Exhibit O, that you had a sleeve head with a cylindrical exterior and that the clearance between the cylindri-

(Testimony of Fred Hosterman.)

cal exterior and the inside of the nut is as large as the clearance between the interior of the nut and the sleeve head in the toe, which is the point of greatest clearance, would there be any difference then in ease of removability between such a sleeve head with a cylindrical exterior and a sleeve head with an angle on the exterior?

A. So far as removability alone is concerned, I would expect no difference.

Mr. Beehler: No further cross.

Redirect Examination

By Mr. Freeman:

Q. I should have asked you this on direct. Have you written any papers, or do you do any editorial work in applied hydraulics?

A. Yes. I have been serving as aviation editor for the magazine *Applied Hydraulics*. [957]

Q. And in that connection your work has been primarily in hydraulics, the editorials all have to do with hydraulics? A. That is right.

Mr. Freeman: That is all.

The Court: Any further questions?

Mr. Beehler: No further questions.

RALPH MIDDLETON

called as a witness by and on behalf of the plaintiff, in rebuttal, having been first duly sworn, was examined and testified as follows:

The Clerk: Please state your name.

The Witness: Ralph Middleton.

Direct Examination

By Mr. Van Sciver:

Q. State where you reside, Mr. Middleton.

A. In North Hollywood.

Q. What is your present occupation?

A. I am presently employed by the Lockheed Aircraft Corporation.

Q. And you are a graduate aeronautical engineer? A. Yes.

Q. From what college did you graduate?

A. University of Michigan.

Q. In what year? [958] A. 1929.

Q. And you received a degree in aeronautical engineering?

A. Bachelor of Science in aeronautical engineering.

Q. After you graduated from that university what did you do?

A. I went to work for the government at Wright Field, for the Army Air Corps at that time.

Q. Is that as a civilian engineer?

A. As a civilian engineer.

Q. How long did you remain at Wright Field?

(Testimony of Ralph Middleton.)

A. I was there until May of 1940.

Q. What was your first position when you went to Wright Field?

A. I went there as an air dynamacist specializing in air dynamics.

Q. How long did you hold that position?

A. Well, it was a little bit indefinite, because actually I practiced air dynamics as such for about between two and three years; however, during that time I received assignments to work on shock struts, landing gear shock struts, and gradually assumed more and more duties in that connection and less and less air dynamics.

Q. What was your next assignment after that?

A. Finally the landing gear division was separated from [959] the air dynamics division and I was given the job as civilian head of the shock strut and landing gear hydraulics work.

Q. Were you in charge of the hydraulic laboratory at Wright Field? A. Yes, I was.

Q. How long did you remain in charge of the laboratory?

A. Until I left Wright Field in 1940.

Q. During the time that you were head of the laboratory and in charge of the landing gear and hydraulics section, did you have any actual experience with fittings for hydraulic tubing?

A. Yes, I did.

Q. Did you actually install such fittings yourself? A. Yes.

Q. Disassemble them? A. I did.

(Testimony of Ralph Middleton.)

Q. Have you actually flown in planes in which hydraulic systems were used?

A. Yes, I have.

Q. What did you do when you left Wright Field?

A. I went to work for the Curtiss-Wright Airplane Corporation in St. Louis; Robertson, Missouri.

Q. How long did you remain with that company? A. One year.

Q. Did you have any occasion to work with hydraulics, [960] tubings, and fittings, when you were with Curtiss-Wright?

A. Yes, I did. I was the landing gear staff engineer and had to design the landing gear and retracting mechanisms, and as such worked directly in co-operation with the hydraulics staff engineer who designed the plumbing and control systems that we used in connection with the landing gear.

Q. What was your next position?

A. I went to Burbank, California, and became chief engineer for the Aircraft Accessories Corporation.

Q. Were you familiar with and did you use aircraft fittings while you were employed by the Aircraft Accessories Corporation? A. Yes.

Q. Do you know the kind of fittings that are in use generally on aircraft at the present time?

A. Yes.

Q. Are you familiar with the AN standard fitting? A. Yes, I am.

(Testimony of Ralph Middleton.)

Q. Also the present AC-811 fitting?

A. Yes.

Q. In the AN fitting used at present is there a sleeve head angle on the external wall of the sleeve as shown in the drawing Defendants' Exhibit O?

A. Yes, there is.

Q. Is there, likewise, a similar angle on the present [961] AC-811 fitting?

A. Yes, there is.

Q. Was there such an angle on the old AC-811 fitting?

A. No. The original AC-811 fitting, which was the first three-piece fitting that was used in the aircraft industry, had a sleeve which had a straight side and actually had more relative clearance between the nut and the sleeve than appears to be shown by that sketch.

Q. In 1930 or '31 at Wright Field are you familiar with the type of fittings that were then used by the Army on aircraft?

A. Yes.

Q. What type of fitting was that?

A. In the beginning or when I first went to work for the government there were no hydraulic mechanisms used on aircraft for retracting landing gear, and the only hydraulic mechanisms that were actually used were in connection with the brakes. Tube fittings at that time were primarily used in the power plant section in connection with the fuel and lubrication sections of the engine, and they were largely of a type which was known then as the cone and union type, which was a kind of a ball-

(Testimony of Ralph Middleton.)

ended male portion that nested into a tapered female portion, and then a nut screwed the two parts together and held the spherical end of the male portion into the tapered end of the female portion. Those two portions [962] were always silver-soldered or brazed onto a copper tube. That assembly was the only one at that time which was actually standardized by the Army and shown in their standard drawings.

Q. As hydraulics systems became more in vogue and more complicated was there a different type fitting used by the Army?

A. Yes. As soon as airplanes got to be a little bit larger and the power plant section got to be larger, then it became necessary to use aluminum tubing, from the weight standpoint, and the old cone and union type of fitting could not be used with aluminum tubing, because it wasn't satisfactory to braze that fitting onto an aluminum tube. So that was when the flared type of fitting began to be used.

Q. Was a two-piece fitting used?

A. A two-piece fitting was used universally at that time.

Q. Is that what was known at that time and now as AC810?

A. It is known now as AC810. However, at that time there was no such designation for it. It was just called the Parker two-piece inverted flare type of fitting.

(Testimony of Ralph Middleton.)

Q. Was that two-piece fitting superseded to any extent while you were still at Wright Field?

A. It was almost—I shouldn't say that. It was superseded [963] to a large extent by the three-piece fitting.

Q. That was known as the Parker type three-piece fitting?

A. Yes. There was a drawing that came out that was put out by the Army shortly after this fitting began to be used, and one was put out for the two-piece fitting and one was put out for the three-piece fitting. One was called AC810 and the other was called AC811.

Q. I think you already stated that the AC811 at that time did not have the external sleeve head angle such as shown in Defendants' Exhibit O?

A. That is correct.

Q. And since you left Wright Field have you been substantially continuously in contact and have had knowledge of aircraft fittings?

A. Yes, except for a period of a couple of years when I went into another business, which was not in aircraft.

Q. Were you ever a member of the SAE A6 Committee? A. Yes, I was.

Q. What year was that?

A. That was from about 1941 until 1945. I guess it was 1942. I don't remember the first year it started. I believe it was 1942 that was the first year that that committee actually held meetings.

Q. Have you actually installed both the old

(Testimony of Ralph Middleton.)

AC811 type [964] fittings and the present AN fittings? A. Yes, I have.

Q. And the present AC811 fittings?

A. Yes, I have.

Q. Do you know the reason for the change from the two-piece inverted seat 810 fitting to the three-piece fitting? A. Yes, pretty well, I believe.

Q. Will you explain those briefly?

A. Well, the old two-piece fitting had a great tendency to twist or swedge off the flare, pinch it off from the end of the tube, because of the friction that existed between the tube and the nut primarily, so that the flare on the end of the tube and the nut itself tended to rotate as one piece as it was tightened. There was another reason, and that was that—well, there were two more reasons. One was that the area bearing between the nut and the flare on the tube was quite small, so that the unit pressure being exerted against the flare on the end of the tube was quite high. Another was ease of installation, because it was impossible to back the nut away from the fitting far enough in many cases where the installation was close in the airplane to get a good installation. If the bend was made close to the fitting the tube had to be inserted down into the fitting, and then the nut had to be slid down over the top of it, and the nut [965] couldn't back around the corner, so obviously there had to be a straight portion sufficient to allow the nut to back away far enough to disengage the fitting.

Q. Do you know if the old AC811 fitting with-

(Testimony of Ralph Middleton.)

out the external sleeve head angle is in general use today, or has that been superseded?

A. I believe it has been pretty well superseded by the later style which conforms to the AN drawings.

Q. How do you know that?

A. Well, because in the first place the government services have so specified for a number of years now. And, secondly, when you buy such fittings it is almost impossible to obtain the older type of fitting, except in war surplus or something of that nature.

Q. From your own personal experience do you know the reason for that change?

A. Yes. We had a particularly marked instance while I was at Wright Field, which I personally believe was quite instrumental in causing that change to occur, and that was on the old P-36 pursuit type of airplane, which was made with stainless steel tubing, the hydraulics system was made with stainless steel tubing, and with steel nuts and steel fittings—steel sleeves, rather, and also steel fittings, which was the first time that the Curtiss Company had ever used steel tubing in connection with their hydraulics systems, [966] and it was discovered after the airplanes were in service that a great number of failures had occurred, in fact, all of the fittings that had been installed in that system were found to be defective due to overtorqueing. It was found that the sleeve due to the reduced friction between the steel sleeve and the steel tube, that the

(Testimony of Ralph Middleton.)

sleeves had all expanded quite readily out until they made contact with the nut, so that the sleeve and the nut turned as one piece. That allowed the nut and sleeve assembly as it was rotated to swedge the flare on the end of the tube back until actually there was no flare left, it became a straight portion of tube just merely held into the straight portion of the sleeve by friction and the amount of stress that remained in the end of the tube. So that after the airplane was in service for a little while, that part blew out due to vibration and repeated loadings and caused a number of cases of forced landing of the airplane. [967]

Q. Do you recall any occasion where planes were actually lost or damaged?

A. Yes, there were several airplanes which actually crashed and the pilots were killed as a result of that, because no one at that time had realized the seriousness of landing gear failure on that particular airplane, with the result that when the pilot tried to make a belly landing, he just wound the airplane up in a ball, and himself along with it.

Q. Were those troubles traced by you personally in conjunction with Curtiss-Wright to the actual fittings?

A. Yes. We conducted a number of tests at Sefridge Field, Michigan, and at Wright Field, and also at the Parker plant in Cleveland at that time to determine the cause of the failure and what to do to correct it. It was determined that several corrective measures should be taken.

(Testimony of Ralph Middleton.)

The most immediate thing that was done was to change the dimensions of the flare itself.

The second thing that was done was to introduce torque wrenches so that the mechanics would be educated not to overtighten the nut.

The third thing that was done was that the Parker Appliance Company agreed to institute a program of tests to determine what changes could be made on the fitting to improve it so that such failures would be largely eliminated in the [968] future.

Q. Is there anything in the external sleeve head angle that you have described that would tend to overcome the failures you have testified to?

A. I believe so. In the first place, with the older type of sleeve, the sleeve itself is a relatively weak member, and that also goes for the present sleeve. Inherently in itself it does not have very much resistance against tensile stress which tends to expand the sleeve radially, so it has to be backed up by the nut itself in order to make it strong enough to withstand normal wrench torques which are applied by mechanics in putting this assembly together.

Since the tapered sleeve first contacts the nut down at the heel of the sleeve, that point of contact helps to reduce the tensile stress in the sleeve itself, which increases the amount of torque that can be applied before the sleeve is overstressed sufficiently to make the whole sleeve come in contact with the nut.

(Testimony of Ralph Middleton.)

Now, since the area of the sleeve that is in contact with the wall of the nut is relatively small to begin with, it can rotate more freely in the nut so that the nut is still free to turn without having to make the sleeve turn for a longer period of time during the tightening.

Q. It is true mechanics do overtorque these fittings? A. Yes, indeed. [969]

Q. Even with torque wrenches?

A. Yes, indeed. As a matter of fact, I don't believe even today torque wrenches are used to any great extent in tightening fittings.

Q. In the old three-piece fitting design, was it relatively easy or relatively hard to jam the nut and the sleeve together?

A. Well, I have taken quite a few of them apart and I would judge that there are very few of those that I have ever taken apart that you actually could back the nut off the sleeve without great difficulty.

Q. And in the present-day fitting, is it less likely that the sleeve and nut will jam?

A. Yes, that is true.

Q. Then it is correct to say that there is an additional safety factor to take care of overtorquing in the present fitting?

A. There is, yes. Of course, you can overtorque the present fitting, too. It is possible to jam the sleeve in the nut even with the present fitting. It can be done. Anyone can do it with ordinary wrenches, if he feels like doing so. An unskilled

(Testimony of Ralph Middleton.)

mechanic could quite easily do it even with the present fitting.

Q. But there is some additional margin of safety, even though an unskilled mechanic does over-torque? [970] A. Yes, I believe there is.

Q. What happens if the sleeve and the nut do jam in a fitting of this type?

A. Well, several things can happen. In the first place, of course, it makes the whole fitting assembly harder to take off, to disengage for replacement purposes.

In the second place, if you use that same nut and sleeve over again, then you are apt to swedge the flare itself and dangerously thin it due to swedging action.

In the third place, it is possible to groove the flare or put a groove in it, which creates a point of very great hazard due to vibration, fatigue failure.

Q. Is it possible to actually twist the tube during the make-up?

A. Yes, it is. In fact, that was one of the serious difficulties of the old 810 type fitting. The tube itself would be twisted in assembly so that vibration later on could make the whole fitting assembly loosen up.

Q. What would have to be done then?

A. It would just be a case where you would have to go back over the airplane and retighten the fittings, that was all.

(Testimony of Ralph Middleton.)

Q. What would happen if the flare of the tube is swedged or scored?

A. That is a very bad thing to have happen, because [971] that is the weak point in this fitting, actually, is the section which is clamped, the section of the tube which is clamped between the relatively rigid nose of the fitting and the fairly rigid sleeve, which is being held by the nut. The end of the tube is just gripped at that point, so that any vibration on the tube is transmitted down the tube until it is stopped by that connection right there (indicating).

Q. If there is a scoring of the tube and fuel lines, what might happen?

A. Well, the same thing can happen. Of course, you have a much more critical situation in a fuel line because fuel can leak through the joint much more readily, and a leak is much more serious with fuel than with hydraulic fluid. Then you have a rather serious corrosion problem, too.

Q. Have you had any personal experience with couplings in which the flare was scored or swedged?

A. Well, yes, I have seen service failures of that type. In fact, I have been actually subjected to it myself.

Q. Are tubes and fittings of the type here in question used in close quarters in airplanes?

A. Absolutely.

Q. Does that increase the problem of assembly and disassembly?

A. Naturally, it does.

Q. Are there instances where the tube is bent

(Testimony of Ralph Middleton.)

at an [972] angle closely adjacent the flared end?

A. Well, in many cases the bend is made just as close to the end of the tube as it is possible to get it and still install it.

Q. Is it desirable when removing parts that the nut may separate from the sleeve so that it can go around that bend or a bend?

A. It is very desirable.

Q. And for the nut and sleeve to jam, would that be possible? A. No.

Q. Is there any importance to the area of contact between the sleeve and the nut and what we have called the region of shoulder contact?

A. You mean between the nut and the sleeve itself?

Q. The nut and the sleeve itself.

A. Well, yes, because all of the thrust load that is carried by the fitting and tube assembly is carried on that area and naturally if that area is weak, then the whole tube assembly is weak.

Q. Is there any possibility of failure of parts if that area is weak?

A. Yes, there is. In fact, I have seen cases where the whole tube assembly, the sleeve and tube blew right back out through the back end of the nut, where the back end of the [973] nut would bulge outward and allow the whole sleeve and tube assembly to blow out, come right out through the back end of the nut.

Q. Do you know Mr. Ronald Bergh of Republic Aviation? A. Roland Bergh?

(Testimony of Ralph Middleton.)

Q. Roland Bergh, yes. A. Yes, I do.

Q. Do you know him fairly well?

A. Yes, I have known him for quite a few years.

Q. What is your personal opinion of Mr. Bergh as an aircraft engineer?

A. I think he is a very fine one.

Q. Your testimony about the facts concerning fittings, will you tell us how you know those facts over the last 20 years?

A. How is that again, please?

Q. How do you know these facts over the last 20 years?

The Court: I think, before we get into that, we had better take our afternoon recess. We will now recess until 20 minutes after 3:00.

(Recess.) [974]

Mr. Van Sciver: You may cross-examine.

The Court: I think we had better take some more recesses.

Mr. Freeman: I have got to make good my word, your Honor, that we would finish tonight.

Cross-Examination

By Mr. Beehler:

Q. Mr. Middleton, you referred to the manufacture of a P-36 airplane equipped with stainless steel tubing and steel nuts and sleeves, is that correct? A. That's right.

Q. And it was your statement that there were failures in fittings of that plane due to overtorquing?

(Testimony of Ralph Middleton.)

A. That's right. The failures were not in the fitting; the failures were in the tube.

Q. Suppose those fittings had not been overtorqued, wouldn't the fittings have been all right?

A. If the fittings had not been overtorqued they would have been all right, as far as we know. As far as we could determine by test they would have been all right.

Q. You stated, I believe, that that was one of the things which prompted the inclusion of a sleeve-head angle on the sleeve, on the head of the sleeve?

A. I was led to believe that, yes, from statements made by the Parker Appliance Company at that time. [975]

Q. Would the inclusion of a sleeve head angle on the exterior of the sleeve head entirely obviate the defects due to overtorqueing?

A. No, I would not say that entirely it obviated those defects. I believe those defects are to a certain extent present even today in the present fitting.

Q. Would it not be true that you could secure the same advantages if you made the sleeve head cylindrical, still, but gave it somewhat more clearance than those steel sleeve heads originally?

A. No, I don't believe that would be entirely true. In fact, I am quite sure it wouldn't be true.

Q. Why not?

A. Because in the first place the fitting, because of the overall dimensions of the fitting, there isn't

(Testimony of Ralph Middleton.)

very much room for bearing between the nut and the sleeve. If you allowed enough clearance so that the sleeve would be a separate entity and not supported by the nut, then you would lose so much of the bearing area between the nut and the sleeve that the nut would be greatly weakened. Furthermore, the sleeve itself is already a pretty thin and pretty weak member, relatively speaking. Consequently, if you had lots of clearance there, at least with the dimensions of the fittings as we know them, your sleeve might just as well not be a sleeve; you might as well go back to a [976] two-piece fitting because——

Q. When you overtorque a three-piece fitting of the kind there in Exhibit O, what element gives way first?

A. Well, the first thing that happens is that the sleeve starts to bear or rub against the wall of the nut right down there at what you might call the heel, which is the first section which comes in contact at the junction between the nut and the sleeve, it starts to rub right there, that is the first thing that happens.

Q. Actually, isn't it a fact that the metal of the shoulder gives way first before the surface which bears upon the shoulder of the sleeve?

A. The metal of the shoulder?

Q. Yes. A. In the nut, you mean?

Q. In the nut.

A. No, I don't believe so. In fact, I am quite

(Testimony of Ralph Middleton.)

sure that actually the sleeve starts to rub against the nut long before the nut itself starts to fail.

Q. What part of the sleeve starts to rub against the nut?

A. It is that largest diameter of the sleeve that starts to rub first.

Q. Do you mean the exterior circumference?

A. Yes, it starts to rub against the nut. [977]

Q. How do you know that?

A. From actual experience with it. I have taken them apart.

Q. Did you ever take any physical measurements and find out how much the sleeve expanded when overtorqued?

A. No, I can't say that I have. However, I have examined quite a few specimens that have been overtorqued. I don't think in most cases it is possible to take accurate measurements, because so much of the metal has been rubbed off of the sleeve that you can't really measure it accurately. [978]

Q. How did you make your examination?

A. By taking them apart and examining them.

Q. You mean cut-away sections?

A. Not necessarily, no. Just pulled them apart and looked at them.

Q. Then you didn't take any measurements before to see what changes in size there might have been afterwards?

A. Yes. We certainly did quite a bit of that at Wright Field and a lot of the test work that was done in connection with that investigation which

(Testimony of Ralph Middleton.)

I mentioned earlier was by means of taking measurements before and after, and torque wrench measurements also. In fact, the series of such measurements was used as the basis for the requirements for the repair of this particular airplane.

Q. Do you have any of that data with you?

A. I don't have any of that data, not here, no. As a matter of fact, it was such data that was used as the basis for setting up the torque requirements in the present military specifications for hydraulic systems that are used today. They were based on torque measurements that were made at that time.

Q. When you assemble a body, a sleeve, and a nut, made in accordance with Army-Navy specifications, with a tube flare like Army-Navy specifications require, and you couple them up using recommended torque, and screw it tight enough [979] so that some portion or other of the sleeve head hits the inside of the nut, which part hits first?

A. The largest diameter of the sleeve hits first.

Q. Tell us again how you know that?

A. From actually doing it. You can see.

Q. Will you just please describe for us the mechanism, the procedure that you went through in order to determine that?

A. Well, you take a tube——

Q. How did you do it?

A. Well, by taking a tube and taking a nut and a sleeve just selected at random, and making a flare, and miking across the nose of the flare so as to be sure that the flare is made within the required

(Testimony of Ralph Middleton.)

limits, and those limits are such that the nose of the flare must be of a diameter greater than the inside diameter of the tapered portion of the sleeve, and must be less than the inside diameter of the nut, and then just assembling the joint and applying torque in increments, and then after, we will say, 10 increments, after each one of the increments, take it apart and examine the parts.

Q. When did you do that last?

A. Well, that was 1941, between 1940 and 1941.

Q. After the first tightening up, did it expand to fill the nut? A. No. [980]

Q. Did it after the second tightening up?

A. No.

Q. Did it after the fifth tightening up?

A. Yes, I would say about the fifth tightening up would be when it usually occurred.

Q. What torque did you use on the fifth tightening up?

A. Well, that would be something, oh, in the neighborhood of about 25 per cent or so in excess of the recommended torque value, somewhere in that neighborhood.

Q. And when the end of the sleeve head adjacent the shoulder expanded enough to fill the inside of the nut, it is true, is it not, that the toe of the sleeve also had expanded enough to hit the inside of the nut? A. Yes, I believe that is true.

Q. And it is true, is it not, that the mid-portion between the toe and the shoulder had likewise expanded enough to hit the inside of the nut?

(Testimony of Ralph Middleton.)

A. Well, yes. You finally reach a condition where the whole sleeve, the whole area of the sleeve is in contact with the nut, that is true.

Q. And that happens after about five remakes of the coupling?

A. Well, I think you have misunderstood me. My use of the word "increment" did not mean to imply that that meant [981] five assemblies and disassemblies of that coupling. It meant that I increased the amount of torque that was being applied to the nut in increments. The first increment would be something below the recommended torque. The second increment would be a little bit more, and by about the fifth increment we would be up to the recommended torque, and by about the tenth increment, we would be at about double the recommended torque.

Q. Well, isn't it true, also, that as you increased the torque in order to press the sleeve head outwardly, you will get a contact at the nose of the sleeve radially with the inside of the nut before you get a contact at the end of the sleeve head nearest the shoulder? That is true, isn't it?

A. No, I don't believe it is true. I think you get your first contact down there at the heel.

Q. You say, Mr. Middleton, that you believe. What did you find to be the case?

A. That is what I found to be the case, that your first contact there is a rubbing action which can be discerned by marks on the surface.

(Testimony of Ralph Middleton.)

Q. Did you make that measurement with a stop-and-go-gauge?

A. No, just made it by visually examining the surface inside after disassembly. [982]

Q. When you disassembled those couplings, how did you measure the diameter of the inside of the nut?

A. Did not measure the diameter of the inside of the nut at all.

Q. Then you really didn't know what the difference was between the exterior diameter of the sleeve head after expansion and the inside diameter of the nut; that is true, isn't it?

A. That is true.

Q. You mentioned also, Mr. Middleton, that there was an increase in ease in installation of three-piece fittings over the ease of installation of two-piece fittings.

A. That is right.

Q. Isn't it true it is just as easy to install three-piece fittings of the old 811 type, of the kind that were in vogue before the application of the sleeve head angle and the present AC-811 fittings, where the sleeve head angle is installed?

A. Yes, the installation problem is the same in either of those two cases.

Q. And it is substantially the same, also, with the AN fitting, is that not true?

A. That is true.

Mr. Beehler: That is all.

Mr. Van Sciver: That's all, Mr. Middleton.

(Witness excused.) [983]

Mr. Freeman: Mr. Wolfram, will you take the stand.

JOHN N. WOLFRAM

called as a witness on behalf of the plaintiff, in rebuttal, having been previously sworn, resumed the stand and testified as follows:

Direct Examination

By Mr. Freeman:

Q. Do you have the book of patents with you?

A. Yes.

Q. Mr. Adams in connection with his direct testimony referred to the Benzion patent. Will you turn to that patent?

No. 15 in your book, your Honor.

Do you find in that patent any sleeve head angle?

A. No, I don't.

Q. And do you find that the sleeve head shoulder which contacts with the nut is substantially midway along the angular or inside angle of the sleeve itself?

A. Yes, it is substantially midway or even less than midway.

Q. Likewise, the sleeve itself is made on a radius as distinguished from conical; correct?

A. Yes, the inside flare surface of the sleeve is a convex radius. It is a convex surface.

Q. Likewise, the body member referred to by the numeral [984] or character of C has a male member that is on a radius?

A. Yes.

Q. Or arcuate?

(Testimony of John N. Wolfram.)

A. It is a concave surface.

Q. Is there any indication of what we have here referred to as initial or toe contact illustrated in the Benzion patent? A. No, none at all.

Q. Will you next turn to Guyer—No. 4 in your book, your Honor—and do you there find a sleeve head that is tapered or at an angle?

A. No.

Q. And do you likewise find that the shoulder of the sleeve head is substantially midway along the portion of the sleeve which engages the flare of the tube? A. Yes.

Q. I take it that you agree with Mr. Adams that it would be impossible or almost impossible to remove the sleeve due to the ridges or corrugations of the sleeve which imbed in the tubes themselves?

A. Yes, they would imbed so that you couldn't draw the sleeve back off the tube very well without shearing metal.

Q. When you say "shearing" metal, there would be an imbedment or an imbedding of the ribs within the metal and you would have to scrape that metal as you remove the sleeve? [985]

A. That's right.

Q. Incidentally, the Guyer patent was a file wrapper reference in 1,893,442 patent, as well as a file wrapper reference to the Parker 1,977,240 patent, is that correct? A. Yes.

Mr. Huebner: Those, your Honor, are not the patents in suit.

(Testimony of John N. Wolfram.)

Mr. Freeman: The 1,893- patent is the one that Parker refers to in the patent in suit, and also the 1,977,240 patent.

Mr. Huebner: Both of them are referred to in the patent in suit.

Q. (By Mr. Freeman): And the McConnell patent that I am going to ask you to refer to—No. 5 in your book, your Honor,—it, too, was a file wrapper reference against 1,893,442 Parker patent; correct? A. Yes.

Q. I take it that the McConnell patent illustrates a hard metal contact or engagement with a body member on the right-hand side of Figure 1; correct?

A. It is for coupling the hard metal pipe, but there is a gasket, a soft gasket between the pipe and the body.

Q. And that soft gasket is to accomplish what a lead pipe or another soft metal might accomplish between a sleeve and a body?

A. That's correct, the gasket actually provides the seal against the body, and in turn against the outer member, [986] I think that is C'.

Q. Is there any what we have called initial or toe contact illustrated in the McConnell patent?

A. No.

Q. Is there any angle on the sleeve head in the McConnell patent? A. No.

Q. And is it, likewise, true that in the McConnell patent the shoulder of contact between the sleeve and the nut itself is substantially midway of the angular portion within the sleeve?

(Testimony of John N. Wolfram.)

A. That's correct.

Q. And is there any clearance of any kind provided for expansion in the McConnell disclosure considering now the left-hand side of Figure 1?

A. There is no clearance shown.

Q. Is it true that when you use a soft pipe or a packing member, that the pipe itself or the packing member gives or is compressed by the action of the sleeve and the body member? A. Yes.

Q. And I take it you agree with Mr. Adams that the disclosure of the Bjorling publication—No. 19 in your book, your Honor—discloses no sleeve head angle?

A. No, it does not have a sleeve head [987] angle.

Q. And, likewise, does not disclose any initial or toe contact? A. That's correct.

Q. And, of course, that is for a lead or other composition pipe; correct? A. Yes.

Q. Turning now to Parker patent No. 1,893,442, which is one of the patents referred to by Parker in the patent in suit—No. 17 in your book, your Honor—does that disclose any angle on the sleeve head? A. No.

Q. Does it disclose any clearance between the sleeve head and the nut?

A. There is no clearance shown.

Q. Turning now to Parker patent No. 1,977,241—No. 18 in your book, your Honor—that was a file wrapper reference, was it not, to the Parker patent in suit? A. Yes.

(Testimony of John N. Wolfram.)

Mr. Huebner: It was. [988]

Q. (By Mr. Freeman): And the other Parker patent, No. 1,977,240, was specifically referred to by Parker in the patent in suit? A. Yes.

Q. Do you find any solid head or solid sleeve member in Parker patent No. 1,977,241?

A. No.

Q. Do you find any angle or tapered portion on the outside of the sleeve? A. No.

Q. That patent primarily is directed to take care of parts when they are misaligned?

A. That is correct.

Q. And you go along with Mr. Adams that the engagement between the sleeve and the nut is on a curved or arcuate portion, on a radius, so to speak; correct? A. Yes, on a section of a sphere.

Q. Have you recently made any tests or demonstrations of the devices like Parker patent 1,977,241?

A. Yes.

Q. Did you, at my instructions, take one of the AN sleeves and cut it out or remove metal therefrom so as to illustrate at least in principle of operation, Parker patent No. 1,977,241?

A. Yes, I have. [989]

Q. And did you then torque up the parts by assembling them together? And, if so, tell us what you discovered.

A. I torqued up a No. 6 fitting in steel, and the lower part of the sleeve, which corresponds to the numeral 15 in the 1,977,241 patent expanded out against the wall of the nut and also split.

(Testimony of John N. Wolfram.)

Q. When you say you torqued them up, did you then use normal torque? A. Yes, I did.

Q. And do you have that fitting here?

A. Yes, I have. Well, I don't seem to have the one I referred to here.

Q. Of the many fittings you have here, will you take one, hand it to me so it may be identified, and then tell us what your experience was with respect to that particular fitting? For the record, tell us just what you are handing me, by number or type.

A. I have here a No. 6 steel fitting, which I made in accordance with the 1,977,241 patent.

Q. And what did you discover as a result of bringing this fitting up to proper torque?

A. The sleeve jammed into the nut.

Mr. Freeman: I offer in evidence the fitting just referred to by the witness as Plaintiff's Exhibit 79.

The Court: It may be received. [990]

(The fitting referred to was received in evidence and marked Plaintiff's Exhibit No. 79.)

The Witness: Here is the tube that goes with that fitting.

Q. (By Mr. Freeman): Will you take another fitting and tell us what happened when you tested that particular fitting?

A. I have another fitting in aluminum which was formed in the same manner by reworking an AN sleeve and using the other AN parts—reworking the sleeve in accordance with the patent 1,977,-

(Testimony of John N. Wolfram.)

241. It was torqued and the sleeve has expanded out to the point where it is just about catching in the nut.

Q. And was that as a result of the initial torqueing and what we call normal torqueing?

A. Yes, it was.

Q. Did you actually make any measurements of the inside of the nut and the outside of the sleeve?

A. I made measurements of the outside of the sleeve, but I did not make them of the nut.

Q. And what report do you have?

A. On the No. 6 aluminum fitting with the copper silicon sleeve——

Q. Is that the one that you have just handed me? A. That is correct.

Mr. Freeman: I am going to ask the clerk to mark the [991] fitting Plaintiff's Exhibit 80.

The Court: Are you offering it?

Mr. Freeman: I will offer it in order to save time.

The Court: It may be received.

(The fitting referred to was received in evidence and marked Plaintiff's Exhibit No. 80.)

Q. (By Mr. Freeman): Now, will you proceed and tell us what data you have with respect to Plaintiff's Exhibit No. 80?

A. As initially machined, the lower end of that sleeve, corresponding to the 15 in the patent 1,977,241, was of a diameter equal to .4917. This is about 5.3 thousandths of an inch less in diameter than

(Testimony of John N. Wolfram.)

the front end or toe end of an AN sleeve normally is. This being a reworked proposition from a sleeve, it was necessary to take a little bit of the metal off at that point, so that we had a greater clearance to begin with at the toe end of that sleeve, or I should say at the lower end, corresponding to the part 15 in the patent 1,977,241, than we normally have in the AN assembly.

After torquing it up to the normal torque of 100 inch pounds, the sleeve was measured at this point through slots in the nut, and it then measured .5175 thousandths of an inch, which is an expansion of .0258 on the diameter.

The fitting was then taken apart and the sleeve was worked out of the nut and it was then measured again, and this [992] diameter was .05082 after disassembly, indicating that the sleeve had taken a set at this point of .0165 thousandths. [993]

Also, the angularity of the surface corresponding to the outer surface of the part 15 of patent 1,977,241—and by “outer” I mean the part that faces away from the body and not the part that is adjacent to the body as shown in Figure 3—the angularity of this surface was made—well, it called for 27 degrees on my drawing because that would make it an angular difference of 10 degrees, then, with the body member, the AN body member, the 10-degree angularity difference being taken from this patent 1,977,241 as shown in Figure 3, you will see that the body roughly has an angularity of 40 degrees; I shouldn’t say “roughly” but

(Testimony of John N. Wolfram.)

that is the angle of the cord of the spherical segment of the body, and the corresponding angularity of the sleeve is 50 degrees on the inner surface, and the inner surface is parallel or concentric with the outer surface. That is why I chose the angle 27 degrees for this particular sample. After assembly it was found that this angle changed so that it measured 32 degrees and 33 minutes on one side and 31 degrees 40 minutes on the other side.

Q. Is it fair to say that the thin portion below the part referred to by the reference character 10 actually flexed outwardly, the thin section?

A. Yes, the flexing started from a point just below the heavier section 10, and I have some measurements on that, too. The vertical part of the sleeve wall just below [994] the shoulder portion 10 on my initial sample was 3 degrees 10 minutes on one side and 3 degrees 28 minutes on the other side, to begin with, and these changed from 5 degrees on the one side to 18 degrees and 30 minutes on the other side.

Q. Now, with respect to patent No. 1,977,240, it too shows a shoulder on the sleeve and nut that is arcuate?

A. Well, initially the shoulder on the sleeve is straight across as shown in Figure 3, and I think that the shoulder on the nut is not arcuate but conical. At least, that is the way the drawing appears. I don't quite remember what the spec says.

Q. So as a result of that engagement, that is, of the conical portion on the nut against the shoul-

(Testimony of John N. Wolfram.)

der of the sleeve, the lower end of the sleeve head is actually driven in or compressed?

A. That's correct, as shown in Figure 5, the lower end of the sleeve swings inwardly because of the couple that is set up by the bearing point of the shoulder of the nut at the outer circumference of the sleeve shoulder, and the bearing between the small diameter of the flared surface of the sleeve against the base of the flare, and in swinging inwardly in this manner it loads the sleeve with hoop compression as contrasted to hoop tension. In other words, there has been a contraction here instead of an expansion.

Mr. Freeman: That is all. You may [995] cross-examine.

Cross-Examination

By Mr. Beehler:

Q. With reference to your last answer on patent No. 1,977,240, did you ever make up a coupling like that and test it? A. No, sir, I didn't.

Q. So that what you have said is a conclusion, rather than an observation?

A. Well, I was following the teaching or the explanation in the patent.

Q. Actually, isn't it true, Mr. Wolfram, that there would be a hoop compression only adjacent the shoulder and not adjacent the toe?

A. Oh, no. If the toe is going to contract as shown in the patent drawing, contraction automatically loads it with hoop compression, in the

(Testimony of John N. Wolfram.)

same manner that expansion would load it with hoop tension.

Q. Now, will you refer to Parker patent No. 1,977,241, about which you have just testified as having made a sample and as having tested. You said, I believe, that when that sample was drawn up under normal torque there was an expansion at the toe portion 15, the lower portion 15, I believe you called it. How much torque did you apply in inch pounds?

A. The normal torque which is used on AN fittings, which [996] is the torque which has been determined necessary for a seal on this particular type of tubing, type and size of tubing.

Q. How much is that?

A. No. 6, I would have to refer, I think, to the torque sheet, the AN torque sheet.

Q. Let's pass that question, then, Mr. Wolfram, and let me recall again the fact that I believe you said that the portion 15 expanded outwardly until it hit inside of the nut, is that correct?

A. Yes.

Q. And then when you unscrewed it and released it there was a return of that portion of about 9-3/10/1000ths according to my figures as you gave them?

A. Which one are you speaking of, the dural fitting or the steel fitting?

Q. Exhibit No. 80.

A. That is the dural fitting?

Q. Yes.

(Testimony of John N. Wolfram.)

A. About 9/1000ths is correct. I don't know what the 10ths come out.

Q. Wouldn't that return be enough to have the portion 15 pull away from the nut and release it?

A. Well, that depends upon how much the fitting or the sleeve has imbedded into the nut in the first place. [997]

Q. Well, having found that the sleeve expanded too much and the desire was not to have it expand quite so much, would you, as an engineer, cut the amount of metal in the part 15, reduce it?

A. If I wanted to obtain the advantages of the teaching of this patent, I would enlarge the nut, or do some other thing to take care of that situation.

Q. And it would be a perfectly obvious expedient, would it not, to add more metal to the part 15?

A. If you do that, then you don't have the teaching of this patent.

Q. And what is that teaching?

A. The teaching of this patent is for taking care of misalignment of tubing by shifting or by allowing the tube to swing on spherical seats.

Q. Supposing you keep everything, except that you make the thickness of the part 15 a little bit greater, would that not minimize the amount of expansion for the same torque that you used?

A. Well, it might, but the swinging out started and pivoted from the point just below the shoulder 10.

Q. Well, is it not true that the spherical surface

(Testimony of John N. Wolfram.)

11 and the surface 13 are the parts that permit that misalignment?

A. Oh, no. You have to have spherical surfaces on [998] both the—or, I shouldn't say both. You have to have them on the body, the tube, the sleeve, and the nut.

Q. Let's keep all of the spherical surfaces and just make the part 15 a little bit thicker. Isn't that a perfectly obvious thing to do to make it more resistant to expansion?

A. The part 15?

Q. The part 15.

A. Well, that is the question I just answered, that the swinging out started or pivoted from the point just below the shoulder 10 in the vertical part of the sleeve.

Q. Well, if we made that a little bigger, wouldn't it resist swinging out a little bit?

A. Well, if you made that part thicker, that being the pivot part, I am not so sure you would have any resistance, because you wouldn't have any lever arm at that point.

Q. If we made it thinner, it would swivel out a little bit quicker, then, wouldn't it?

A. I think the chances are if you vary the thickness, it would vary the characteristic somewhat.

Q. That is, if we made it thicker, we would make an altogether different invention, is that your conclusion?

A. Well—

Q. Is it?

A. I don't know what you mean by that. [999]

(Testimony of John N. Wolfram.)

Q. If we made the part adjacent the section 10, immediately below the section 10, a little bit different in thickness, we would change the character of the invention; is that your contention?

A. Yes. I think that that is something that this patent doesn't go into or disclose.

Q. Will you refer to the Benzion patent? I would like to read you from the first page of the patent, column 2, beginning line 81, the following:

“Furthermore, due to the loose fit of the flanges n, n, over the sleeve D, D and of the nut N, N over the shoulders or flanges d, d, and the engagement of the inner faces of the flanges n, n with the outer faces of the flanges d, d in planes perpendicular to the axis of the splice-core-duct C, the parts are permitted to adjust themselves and binding is avoided.”

Does that not indicate to you that a clearance was provided there in order to prevent a binding between the sleeve and the nut when the nut is unfastened?

A. At what point do you mean when you speak of “there”?

Q. The part that I just read.

A. There are two points, as I see it. There are two [1000] points of clearance between the sleeve and the nut, one along the smaller diameter of the sleeve D, D and one along the head of the sleeve next to the thread.

(Testimony of John N. Wolfram.)

Q. What I just read means a clearance at both places, does it not?

A. No. I think it means a clearance along the smaller part of the sleeve, because the description says:

“due to the loose fit of the flanges n, n”

and that is the in-turn part of the nut:

“over the sleeve D, D”

It doesn't say anything about the clearance at the thread.

Q. What about the rest of it,

“and the engagement of the inner faces of the flanges n, n with the outer faces of the flanges d, d”

A. “in planes perpendicular to the axis”

Q. “in planes perpendicular to the axis”

A. That would be the transverse of the shoulder engagement we have been speaking about.

Q. There isn't any clearance in the shoulder, is there?

A. It doesn't say there is a clearance. It says there is an engagement.

“the engagement of the inner faces of the flanges n, n” [1001]

All that means is a sleeve could slide straight across those shoulders.

Q. Let's suppose there is a clearance where you said there was at the small portion of the sleeve, and let's suppose there wasn't any clearance between the exterior of the sleeve head and the inside

(Testimony of John N. Wolfram.)

of the nut. How then would there be any adjustment possible?

A. Well, of course, there wouldn't have to be clearance at both places normally to have any side-ward shift, but here, of course, the nut is threaded all the way back, and the thread is opposite the head of the sleeve, and I don't know if he intended that the nut or the sleeve could ride into those threads or not.

Q. It is true, isn't it, you would have to have a clearance in both places if you were going to have any adjustment at all?

A. You could start with it in the thread or else make it as you pull your coupling up by slightly compressing the fine crest on the thread.

Q. If you didn't have a clearance there at both places, then you would have no adjustability, no freedom of movement between them, that is true, isn't it?

A. You wouldn't have any initial ability to move. It would have to make its own path in the region of the threads. That is what it means. [1002]

Q. You wouldn't have any at all, isn't that so?

A. If you have just the fine crest of the thread to contend with, just a hairline, the thread could quite easily flatten out there a little bit against the sleeve head, so that even though you might have a little bit of resistance to shifting, you could still have it.

Q. You said about Benzion in another connection you distinguished it as having a somewhat

(Testimony of John N. Wolfram.)

arcuate internal face on the flare of the sleeve and a somewhat concave arcuate effect on the nose of the body. Is that correct? A. Yes.

Q. Is that the invention that is present in the patent in suit? A. The -2,212 patent?

Q. Yes.

A. Having an arcuate face on the——

Q. Is it a fact that that does not have arcuate faces but conical faces instead, the invention?

A. No.

Q. You mentioned, with respect to the Guyer patent, No. 4, and it was not clear to me which of the two Guyer patents that was. Will you tell me?

A. It is the 196,084 patent. I don't believe the other one has any ribs that we spoke of. [1003]

Q. Very well. You mentioned that the feature of the Guyer patent which made it objectionable was the fact that there were ribs which caused the sleeve to bind upon the flare of the tube; am I correct?

A. Yes, the ribs would prevent withdrawal of the sleeve from the tube.

Q. Is it your contention that the invention present in the patent in suit consisted of the fact that those ridges are omitted?

A. No, I don't think that that is the teaching of the patent in suit.

Q. Now, with respect to the McConnell patent, you said, I believe, that in connection with Figure 1, the showing on the left-hand side, that there did not appear to be any clearance between the exterior

(Testimony of John N. Wolfram.)

of the head of the sleeve C and the interior of the nut D. That was your observation, was it not?

A. Yes, I said that the drawing did not disclose a clearance.

Q. Does the specification disclose that there was no clearance?

A. I would have to check the spec again to see whether it mentions anything.

The Court: Mr. Beehler, how much more time do you want this afternoon? [1004]

Mr. Beehler: Five minutes.

The Court: Do you want to come back here tomorrow?

Mr. Beehler: I would rather finish now.

The Court: You had better finish it real quick if you don't want to come back tomorrow.

Mr. Beehler: Very well.

Mr. Freeman: We will hold him to that five minutes, your Honor.

Mr. Beehler: I will be glad to pass the last question.

Q. (By Mr. Beehler): I will ask you would it not be necessary to at least have a slip fit between the sleeve head and the inside of the nut to get the parts together?

A. Well, you could have a line and line fit.

Q. If you had a lead tubing you would have no expansion, isn't that true?

A. Expansion of the sleeve, do you mean?

Q. Of the sleeve, yes.

A. No, I don't believe there would be expansion.

(Testimony of John N. Wolfram.)

Q. Then you wouldn't need to have any clearance in order to get the parts separated, would you?

A. No. And if you didn't have expansion you wouldn't have hoop tension and all its advantages.

Mr. Beehler: That is all.

Mr. Freeman: That is all, and plaintiff rests, your Honor. [1005]

The Court: I assume that you want to brief this case to the court?

Mr. Freeman: I would suggest that, your Honor. There have been many points raised by myself and by Mr. Huebner, and I would like to get back to where we have the library facilities, where we have the record in front of us, and if I may make this suggestion in order to save time, if Mr. Huebner goes along, I would be perfectly willing that we submit simultaneous briefs, or any way that your Honor wants it. We want to submit all the facts and present all the points to your Honor.

The Court: Fortunately I think you have plenty of time, because the court will not be able to consider this case until after the first of September.

Mr. Huebner: If the court had time, I would be willing to submit it without briefs and without argument.

The Court: I wouldn't advise you to do that. I think you had better brief this case.

Mr. Huebner: Well, then, let's file simultaneous briefs. We both know from this threshing out we have had the last eight or nine days what the points

are, and we might as well put in briefs and be done with it.

The Court: All right. Supposing you put in your briefs in 30 days, and if you want to reply, then you can put in a reply brief in 10 days. [1006]

Mr. Freeman: All right. I can do it that way, or—let's do that.

Mr. Huebner: I had in mind no reply brief. Let's file our briefs simultaneously, and that is it.

Mr. Freeman: I did, too. I may suggest, if I may, that I am driving back, and I won't get back for a couple of weeks, and I have been away from my office for five weeks and I am almost afraid to go back there because of the pile-up of work, and as long as your Honor won't be able to pass upon it until after the first of September, can we make that 60 days?

The Court: If you are not going to file any reply briefs, then you get your briefs in by the first of September.

Mr. Huebner: That will be fine.

Mr. Freeman: I want to take this opportunity to thank the court for its patience while we have been arguing.

The Court: I have been educated. I have been going to school, taking a postgraduate course in patent law.

Mr. Huebner: It has been a pleasure to be here, even during my vacation.

The Court: The case will be submitted, briefs to be filed by the first of September.

(Whereupon, at 4:20 o'clock p.m., the matter was submitted pending the filing of [1007] briefs.)

Certificate

I hereby certify that I am a duly appointed, qualified and acting official court reporter of the United States District Court for the Southern District of California.

I further certify that the foregoing is a true and correct transcript of the proceedings had in the above-entitled cause on the date or dates specified therein, and that said transcript is a true and correct transcription of my stenographic notes.

Dated at Los Angeles, California, this 6th day of July, 1950.

/s/ S. J. TRAINOR,

/s/ SAMUEL GOLDSTEIN,

Official Reporters.

[Endorsed]: Filed January 31, 1951.

[Title of District Court and Cause.]

Civil Action No. 7874-B

NOTICE OF INTENTION TO TAKE
DEPOSITIONS

To: Glenn A. Lane, 1151 Los Angeles Stock Exchange Building, Los Angeles 14, California;
Huebner, Beehler, Worrel, Herzig & Caldwell,
610 South Broadway, Los Angeles 14, California.

Sirs:

Please take notice that on Thursday, April 21, 1949, at 2:00 p.m., the Plaintiff in the above-entitled cause will proceed to take the depositions of: Frederick E. Amon, Jr., 17325 Euclid Avenue, Cleveland 12, Ohio, and R. H. Davies, 17325 Euclid Avenue, Cleveland 12, Ohio, and perhaps others of whom due notice will be given, in accordance with the Federal Rules of Civil Procedure, before W. E. Ferris, or other officer authorized by law to take depositions, at the offices of Thompson, Hine and Flory, 1122 Guardian Building, Cleveland 14, Ohio, when you may attend and cross-examine said witnesses if you see fit so to do.

The taking of the aforementioned depositions will be subject to adjournment from day to day until completed.

Dated this 6th day of April, 1949.

BAIR & FREEMAN,

By /s/ WILL FREEMAN,

By /s/ W. M. VAN SCIVER,

Attorneys for Plaintiff.